UNIT
3

Ed

Get hooked by the unit topic.

Stream to Start Video

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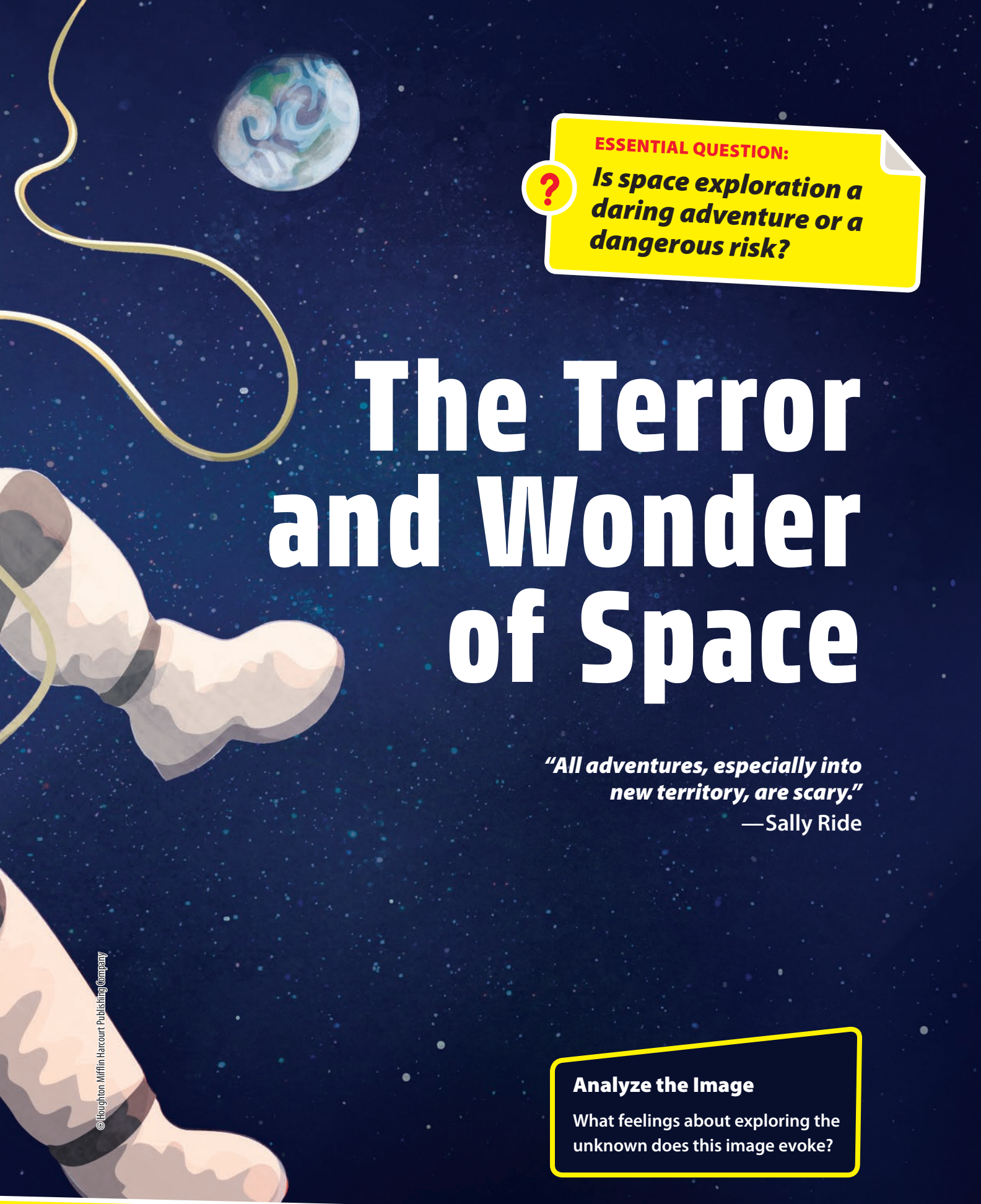

ESSENTIAL QUESTION:

Is space exploration a daring adventure or a dangerous risk?

The Terror and Wonder of Space

"All adventures, especially into new territory, are scary."
—Sally Ride

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Analyze the Image

What feelings about exploring the unknown does this image evoke?

Spark Your Learning

Here's a chance to spark your learning about ideas in **Unit 3: The Terror and Wonder of Space.**

As you read, you can use the **Response Log** (page R3) to track your thinking about the Essential Question.

Make the Connection

What was the last thing you watched, listened to, or read about outer space? Write or sketch your answer.

Think About the Essential Question

Is going to space a daring adventure or a dangerous risk? Explain your opinion.

Sound Like an Expert

You can use these Academic Vocabulary words to write and talk about the topics and themes in the unit. Which of these words do you already feel comfortable using when speaking or writing?

	I can use it!	I understand it.	I'll look it up.
complex	☐	☐	☐
potential	☐	☐	☐
rely	☐	☐	☐
stress	☐	☐	☐
valid	☐	☐	☐

Prove It!

Turn to a partner and use one of the words in a sentence about whether you would risk your life to go to outer space.

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Preview the Texts

Look over the images, titles, and descriptions of the texts in the unit. Mark the title of the text that interests you most.

Dark They Were, and Golden-Eyed

Short Story by **Ray Bradbury**

After fleeing Earth, the Bittering family must adjust to life on Mars.

Martian Metropolis

Science Writing by **Meg Thacher**

Learn what life would be like if humans tried to live on the Red Planet.

Challenges for Space Exploration

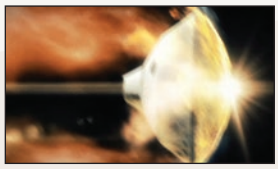
Argument by **Ann Leckie**

The writer ponders whether going to outer space is worth the effort.

What If We Were Alone?

Poem by **William Stafford**

This poem explores how we feel a connection to the universe.



Seven Minutes of Terror

Video by the **National Aeronautics and Space Administration**

See what it takes to make a rover land on Mars.

Humans Need to Explore Outer Space

Argument by **Claudia Alarcón**

The writer argues that space exploration requires a human touch.

Let Robots Take to the Stars

Argument by **Eiren Caffall**

Should robots lead the journey to outer space? This writer says yes.

I Wonder . . .

What is one thing you would be worried about if you had to leave for outer space tomorrow? Jot down or sketch your answer.

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Dark They Were, and Golden-Eyed

Science Fiction by **Ray Bradbury**

ESSENTIAL QUESTION:
Is space exploration a daring adventure or a dangerous risk?

Engage Your Brain

Choose one or more activities to start connecting with the story you're about to read.

Two Truths and a Lie

With a partner, do some quick research to discover a few basic facts about the planet Mars.

1. Write down two facts about Mars.
2. Make up a third "fact" that sounds convincing but isn't true.
3. Test your group or class to see if they can identify which facts are true and which one is false.

Picture Yourself

If you were a Martian, what would you look like? Imagine you've been living on Mars for a while.

- Sketch a quick portrait of your Martian self using whatever style you choose.
- From what you know about conditions on Mars, consider how your physical appearance may change and adapt to the Martian atmosphere over time.
- Be sure to include at least one detail from your Earthling self so your friends can recognize you.

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Analyze Science Fiction

Writers of science fiction often present readers with fantastical settings, characters, and events usually set in the future. At the same time, they often tell stories that in some way comment upon new and emerging science and technology, contemporary society, and human nature in general. As you read Ray Bradbury's story, look for the characteristics of science fiction listed in Focus on Genre.

Focus on Genre

Science Fiction

- explores unexpected possibilities of the past, present, or future
- mixes scientific facts and theories with imaginative settings and plots
- usually includes familiar elements and conflicts found in real life

Analyze Mood

Mood is the overall feeling or atmosphere that a writer creates for a reader. A writer creates mood by

- choosing words carefully to describe the plot, setting, and characters
- revealing what characters think and how they speak

Identifying mood helps you understand a story and be aware of its crafted nature. As you read, think about the effect that particular words have on you. Use the cards below to record three words or phrases from the text that create mood, and note the effect each one has on you. The first card provides an example.

Words: "passengers whispered away"

Effect: "Whispered" sounds secret and mysterious, like they are facing the unknown.

Words:

Effect:

MOOD

Words:

Effect:

Words:

Effect:

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Annotation in Action

Here is a note a student made about this paragraph from "Dark They Were, and Golden-Eyed." As you read, highlight words that create mood by describing the plot, setting, and characters.

The man felt his hair flutter and the tissues of his body draw tight as if he were standing at the center of a vacuum. His wife, before him, seemed almost to whirl away in smoke. The children, small seeds, might at any instant be sown to all the Martian climes.

This description makes me feel like the man is really stressed and worried.

Expand Your Vocabulary

Put a check mark next to the vocabulary words that you feel comfortable using when speaking or writing.

convivial	☐
idle	☐
forlorn	☐
recede	☐
pendulum	☐
muse	☐

Turn to a partner and use one of the vocabulary words you know in a sentence about traveling in a rocket to Mars or living there with other people.

As you read Bradbury's story, use the definitions in the side column to learn the vocabulary words you don't already know.

Background

The author **Ray Bradbury** (1920–2012) was born in Waukegan, Illinois, and his family encouraged him to use his imagination. He started writing stories before his family moved to Los Angeles, California, in 1934. He eventually wrote more than two dozen novels and hundreds of short stories. Several of his works, such as *The Illustrated Man* and *Fahrenheit 451*, became motion pictures. Bradbury received many awards, including a Pulitzer Prize in 2007 for his distinguished literary career.

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Dark They Were, and Golden-Eyed

Science Fiction by **Ray Bradbury**

After fleeing Earth, the Bittering family must adjust to life on Mars.

NOTICE & NOTE
As you read, use the side margins to make notes about the text.

1 The rocket metal cooled in the meadow winds. Its lid gave a bulging *pop*. From its clock interior stepped a man, a woman, and three children. The other passengers whispered away across the Martian meadow, leaving the man alone among his family.

2 The man felt his hair flutter and the tissues of his body draw tight as if he were standing at the center of a vacuum. His wife, before him, seemed almost to whirl away in smoke. The children, small seeds, might at any instant be sown to all the Martian climes.

3 The children looked up at him, as people look to the sun to tell what time of their life it is. His face was cold.

4 "What's wrong?" asked his wife.

5 "Let's get back on the rocket."

6 "Go back to Earth?"

7 "Yes! Listen!"

ANALYZE MOOD

Annotate: In paragraphs 1–6, mark details that reveal the man's first response to Mars.

Analyze: How would you describe the man's first impressions of Mars? How do his feelings affect the mood of the story?

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ANALYZE MOOD

Annotate: Mark details in paragraphs 8–13 that the author uses to create a feeling about the setting of the story.

Analyze: Does the author create a positive feeling or a negative feeling about the setting? What words help create this feeling?

8 The wind blew as if to flake away their identities. At any moment the Martian air might draw his soul from him, as marrow comes from a white bone. He felt submerged in a chemical that could dissolve his intellect and burn away his past.

9 They looked at Martian hills that time had worn with a crushing pressure of years. They saw the old cities, lost in their meadows, lying like children's delicate bones among the blowing lakes of grass.

10 "Chin up, Harry," said his wife. "It's too late. We've come over sixty million miles."

11 The children with their yellow hair hollered at the deep dome of Martian sky. There was no answer but the racing hiss of wind through the stiff grass.

12 He picked up the luggage in his cold hands. "Here we go," he said—a man standing on the edge of a sea, ready to wade in and be drowned.

13 They walked into town.

14 Their name was Bittering. Harry and his wife Cora; Dan, Laura, and David. They built a small white cottage and ate good breakfasts there, but the fear was never gone. It lay with Mr. Bittering and Mrs. Bittering, a third unbidden partner at every midnight talk, at every dawn awakening.

15 "I feel like a salt crystal," he said, "in a mountain stream, being washed away. We don't belong here. We're Earth people. This is Mars. It was meant for Martians. For heaven's sake, Cora, let's buy tickets for home!"

16 But she only shook her head. "One day the atom bomb[1] will fix Earth. Then we'll be safe here."

17 "Safe and insane!"

18 *Tick-tock, seven o'clock* sang the voice-clock; *time to get up.* And they did.

19 Something made him check everything each morning—warm hearth, potted blood-geraniums—precisely as if he expected something to be amiss. The morning paper was toast-warm from the 6 A.M. Earth rocket. He broke its seal and tilted it at his breakfast place. He forced himself to be **convivial.**

convivial
(kən-vĭv´ē-əl) *adj.* A person who is *convivial* enjoys the company of others in a sociable manner.

[1] **atom bomb:** In 1945, in an attempt to end World War II, the United States dropped atomic bombs over the Japanese cities of Hiroshima and Nagasaki. The bombs killed more than 100,000 people and injured many thousands more.

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20 "Colonial days all over again," he declared. "Why, in ten years there'll be a million Earthmen on Mars. Big cities, everything! They said we'd fail. Said the Martians would resent our invasion. But did we find any Martians? Not a living soul! Oh, we found their empty cities, but no one in them. Right?"

21 A river of wind submerged the house. When the windows ceased rattling Mr. Bittering swallowed and looked at the children.

22 "I don't know," said David. "Maybe there're Martians around we don't see. Sometimes nights I think I hear 'em. I hear the wind. The sand hits my window. I get scared. And I see those towns way up in the mountains where the Martians lived a long time ago. And I think I see things moving around those towns, Papa. And I wonder if those Martians *mind* us living here. I wonder if they won't do something to us for coming here."

23 "Nonsense!" Mr. Bittering looked out the windows. "We're clean, decent people." He looked at his children. "All dead cities have some kind of ghosts in them. Memories, I mean." He stared at the hills. "You see a staircase and you wonder what Martians looked like climbing it. You see Martian paintings and you wonder what the painter was like. You make a little ghost in your mind, a memory. It's quite natural. Imagination." He stopped. "You haven't been prowling up in those ruins, have you?"

24 "No, Papa." David looked at his shoes.

25 "See that you stay away from them. Pass the jam."

26 "Just the same," said little David, "I bet something happens."

27 Something happened that afternoon. Laura stumbled through the settlement, crying. She dashed blindly onto the porch.

28 "Mother, Father—the war, Earth!" she sobbed. "A radio flash just came. Atom bombs hit New York! All the space rockets blown up. No more rockets to Mars, ever!"

29 "Oh, Harry!" The mother held onto her husband and daughter.

30 "Are you sure, Laura?" asked the father quietly.

31 Laura wept. "We're stranded on Mars, forever and ever!"

Don't forget to **Notice & Note** as you read the text.

VOCABULARY

Use Latin Roots: The word *submerged* contains the Latin root *merg,* meaning "to dip." The prefix *sub-* means "under." Recognizing Latin roots can help you understand a word's meaning.

Analyze: What does it mean to say the house was *submerged* by a river of wind?

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ANALYZE MOOD

Annotate: Mark examples of sentence fragments in paragraph 33.

Interpret: What do these sentence fragments reveal about Harry's state of mind? How do they help create a mood?

32 For a long time there was only the sound of the wind in the late afternoon.

33 Alone, thought Bittering. Only a thousand of us here. No way back. No way. No way. Sweat poured from his face and his hands and his body; he was drenched in the hotness of his fear. He wanted to strike Laura, cry, "No, you're lying! The rockets will come back!" Instead, he stroked Laura's head against him and said, "The rockets will get through someday."

34 "Father, what will we do?"

35 "Go about our business, of course. Raise crops and children. Wait. Keep things going until the war ends and the rockets come again."

36 The two boys stepped out onto the porch.

37 "Children," he said, sitting there, looking beyond them, "I've something to tell you."

38 "We know," they said.

39 In the following days, Bittering wandered often through the garden to stand alone in his fear. As long as the rockets had spun a silver web across space, he had been able to accept Mars. For he had always told himself: Tomorrow, if I want, I can buy a ticket and go back to Earth.

40 But now: The web gone, the rockets lying in jigsaw heaps of molten girder and unsnaked wire. Earth people left to the strangeness of Mars, the cinnamon dusts and wine airs, to be baked like gingerbread shapes in Martian summers, put into harvested storage by Martian winters. What would happen to him, the others? This was the moment Mars had waited for. Now it would eat them.

41 He got down on his knees in the flower bed, a spade in his nervous hands. Work, he thought, work and forget.

42 He glanced up from the garden to the Martian mountains. He thought of the proud old Martian names that had once been on those peaks. Earthmen, dropping from the sky, had gazed upon hills, rivers, Martian seats left nameless in spite of names. Once Martians had built cities, named cities; climbed mountains, named mountains; sailed seas, named seas. Mountains melted, seas drained, cities tumbled. In spite of this, the Earthmen had felt a silent guilt at putting new names to these ancient hills and valleys.

43 Nevertheless, man lives by symbol and label. The names were given.

Ed

Close Read Screencast

Listen to a modeled close read of this text.

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Don't forget to **Notice & Note** as you read the text.

44 Mr. Bittering felt very alone in his garden under the Martian sun, anachronism[2] bent here, planting Earth flowers in a wild soil.

45 Think. Keep thinking. Different things. Keep your mind free of Earth, the atom war, the lost rockets.

46 He perspired. He glanced about. No one watching. He removed his tie. Pretty bold, he thought. First your coat off, now your tie. He hung it neatly on a peach tree he had imported as a sapling from Massachusetts.

47 He returned to his philosophy of names and mountains. The Earthmen had changed names. Now there were Hormel Valleys, Roosevelt[3] Seas, Ford Hills, Vanderbilt Plateaus, Rockefeller[4] Rivers, on Mars. It wasn't right. The American settlers had shown wisdom, using old Indian prairie names: Wisconsin, Minnesota, Idaho, Ohio, Utah, Milwaukee, Waukegan, Osseo. The old names, the old meanings.

48 Staring at the mountains wildly, he thought: Are you up there? All the dead ones, you Martians? Well, here we are, alone, cut off! Come down, move us out! We're helpless!

49 The wind blew a shower of peach blossoms.

50 He put out his sun-browned hand and gave a small cry. He touched the blossoms and picked them up. He turned them, he touched them again and again. Then he shouted for his wife.

51 "Cora!"

52 She appeared at a window. He ran to her.

53 "Cora, these blossoms!"

54 She handled them.

55 "Do you see? They're different. They've changed! They're not peach blossoms any more!"

56 "Look all right to me," she said.

57 "They're not. They're wrong! I can't tell how. An extra petal, a leaf, something, the color, the smell!"

58 The children ran out in time to see their father hurrying about the garden, pulling up radishes, onions, and carrots from their beds.

59 "Cora, come look!"

60 They handled the onions, the radishes, the carrots among them.

ANALYZE SCIENCE FICTION

Annotate: In paragraphs 53–65, mark the text that describes how the plants are changing.

Analyze: Is Harry's concern about the changing plants realistic? Why do you think the author introduces this detail?

[2] **anachronism** (ə-năk´rə-nĭz´əm)**:** something placed outside of its proper time period.
[3] **Roosevelt:** most likely refers to Franklin Delano Roosevelt, the 32nd president of the United States.
[4] **Hormel . . . Ford . . . Vanderbilt . . . Rockefeller:** names of industrial and financial "giants" in American history.

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61 "Do they look like carrots?"

62 "Yes . . . no." She hesitated. "I don't know."

63 "They're changed."

64 "Perhaps."

65 "You know they have! Onions but not onions, carrots but not carrots. Taste: the same but different. Smell: not like it used to be." He felt his heart pounding, and he was afraid. He dug his fingers into the earth. "Cora, what's happening? What is it? We've got to get away from this." He ran across the garden. Each tree felt his touch. "The roses. The roses. They're turning green!"

66 And they stood looking at the green roses.

67 And two days later Dan came running. "Come see the cow. I was milking her and I saw it. Come on!"

68 They stood in the shed and looked at their one cow.

69 It was growing a third horn.

70 And the lawn in front of their house very quietly and slowly was coloring itself like spring violets. Seed from Earth but growing up a soft purple.

71 "We must get away," said Bittering. "We'll eat this stuff and then we'll change—who knows to what? I can't let it happen. There's only one thing to do. Burn this food!"

72 "It's not poisoned."

73 "But it is. Subtly, very subtly. A little bit. A very little bit. We mustn't touch it."

74 He looked with dismay at their house. "Even the house. The wind's done something to it. The air's burned it. The fog at night. The boards, all warped out of shape. It's not an Earthman's house any more."

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75 "Oh, your imagination!"

76 He put on his coat and tie. "I'm going into town. We've got to do something now. I'll be back."

77 "Wait, Harry!" his wife cried. But he was gone.

78 In town, on the shadowy step of the grocery store, the men sat with their hands on their knees, conversing with great leisure and ease.

79 Mr. Bittering wanted to fire a pistol in the air.

80 What are you doing, you fools! he thought. Sitting here! You've heard the news—we're stranded on this planet. Well, move! Aren't you frightened? Aren't you afraid? What are you going to do?

81 "Hello, Harry," said everyone.

82 "Look," he said to them. "You did hear the news, the other day, didn't you?"

83 They nodded and laughed. "Sure. Sure, Harry."

84 "What are you going to do about it?"

85 "Do, Harry, do? What *can* we do?"

86 "Build a rocket, that's what!"

87 "A rocket, Harry? To go back to all that trouble? Oh, Harry!"

88 "But you *must* want to go back. Have you noticed the peach blossoms, the onions, the grass?"

89 "Why, yes, Harry, seems we did," said one of the men.

90 "Doesn't it scare you?"

91 "Can't recall that it did much, Harry."

92 "Idiots!"

93 "Now, Harry."

94 Bittering wanted to cry. "You've got to work with me. If we stay here, we'll all change. The air. Don't you smell it? Something in the air. A Martian virus, maybe; some seed, or a pollen. Listen to me!"

95 They stared at him.

96 "Sam," he said to one of them.

97 "Yes, Harry?"

98 "Will you help me build a rocket?"

99 "Harry, I got a whole load of metal and some blueprints. You want to work in my metal shop on a rocket, you're welcome. I'll sell you that metal for five hundred dollars. You should be able to construct a right pretty rocket, if you work alone, in about thirty years."

Don't forget to **Notice & Note** as you read the text.

ANALYZE MOOD

Annotate: In paragraphs 78–93, mark words that describe how the other men respond to Harry's observation about changes in the plants.

Interpret: What feeling do the characters' reactions to Harry suggest?

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ANALYZE SCIENCE FICTION

Annotate: In paragraphs 102–113, mark the sentences that describe changes in Sam's appearance, according to Harry.

Analyze: Do you think the changes in Sam's appearance are real, or is Harry imagining them?

Everyone laughed.
"Don't laugh."
Sam looked at him with quiet good humor.
"Sam," Bittering said. "Your eyes—"
"What about them, Harry?"
"Didn't they used to be gray?"
"Well now, I don't remember."
"They were, weren't they?"
"Why do you ask, Harry?"
"Because now they're kind of yellow-colored."
"Is that so, Harry?" Sam said, casually.
"And you're taller and thinner—"
"You might be right, Harry."
"Sam, you shouldn't have yellow eyes."

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Don't forget to **Notice & Note** as you read the text.

114 "Harry, what color eyes have *you* got?" Sam said.
115 "My eyes? They're blue, of course."
116 "Here you are, Harry." Sam handed him a pocket mirror. "Take a look at yourself."
117 Mr. Bittering hesitated, and then raised the mirror to his face. There were little, very dim flecks of new gold captured in the blue of his eyes.
118 "Now look what you've done," said Sam a moment later. "You've broken my mirror."

119 Harry Bittering moved into the metal shop and began to build the rocket. Men stood in the open door and talked and joked without raising their voices. Once in a while they gave him a hand on lifting something. But mostly they just **idled** and watched him with their yellowing eyes.

idle
(īd´l) *v*. When you *idle*, you pass time without doing anything purposeful.

120 "It's suppertime, Harry," they said.
121 His wife appeared with his supper in a wicker basket.
122 "I won't touch it," he said. "I'll eat only food from our Deepfreeze. Food that came from Earth. Nothing from our garden."
123 His wife stood watching him. "You can't build a rocket."
124 "I worked in a shop once, when I was twenty. I know metal. Once I get it started, the others will help," he said, not looking at her, laying out the blueprints.
125 "Harry, Harry," she said, helplessly.
126 "We've *got* to get away, Cora. We've got to!"

127 The nights were full of wind that blew down the empty moonlit sea meadows past the little white chess cities lying for their twelve-thousandth year in the shallows. In the Earthmen's settlement, the Bittering house shook with a feeling of change.
128 Lying abed, Mr. Bittering felt his bones shifted, shaped, melted like gold.
129 His wife, lying beside him, was dark from many sunny afternoons. Dark she was, and golden-eyed, burnt almost black by the sun, sleeping, and the children metallic in their beds, and the wind roaring **forlorn** and changing through the old peach trees, the violet grass, shaking out green rose petals.

forlorn
(fər-lôrn´) *adj*. Something that is *forlorn* appears lonely or sad.

130 The fear would not be stopped. It had his throat and heart. It dripped in a wetness of the arm and the temple and the trembling palm.

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NOTICE & NOTE
AHA MOMENT

When you notice a sudden realization that shifts a character's actions or understandings, you've found an **Aha Moment** signpost.

Notice & Note: Mark the place in paragraphs 132–137 where Harry realizes something.

Infer: What does Harry suddenly understand?

131 A green star rose in the east.

132 A strange word emerged from Mr. Bittering's lips.

133 *"Iorrt. Iorrt."* He repeated it.

134 It was a Martian word. He knew no Martian.

135 In the middle of the night he arose and dialed a call through to Simpson, the archaeologist.

136 "Simpson, what does the word *Iorrt* mean?"

137 "Why that's the old Martian word for our planet Earth. Why?"

138 "No special reason."

139 The telephone slipped from his hand.

140 "Hello, hello, hello, hello," it kept saying while he sat gazing out at the green star. "Bittering? Harry, are you there?"

141 The days were full of metal sound. He laid the frame of the rocket with the reluctant help of three indifferent men. He grew very tired in an hour or so and had to sit down.

142 "The altitude," laughed a man.

143 "Are you *eating,* Harry?" asked another.

144 "I'm eating," he said, angrily.

145 "From your Deepfreeze?"

146 "Yes!"

147 "You're getting thinner, Harry."

148 "I'm not!"

149 "And taller."

150 "Liar!"

151 His wife took him aside a few days later. "Harry, I've used up all the food in the Deepfreeze. There's nothing left. I'll have to make sandwiches using food grown on Mars."

152 He sat down heavily.

153 "You must eat," she said. "You're weak."

154 "Yes," he said.

155 He took a sandwich, opened it, looked at it, and began to nibble at it. "And take the rest of the day off," she said. "It's hot. The children want to swim in the canals and hike. Please come along."

156 "I can't waste time. This is a crisis!"

157 "Just for an hour," she urged. "A swim'll do you good."

158 He rose, sweating. "All right, all right. Leave me alone. I'll come."

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Don't forget to **Notice & Note** as you read the text.

159 "Good for you, Harry."

160 The sun was hot, the day quiet. There was only an immense staring burn upon the land. They moved along the canal, the father, the mother, the racing children in their swimsuits. They stopped and ate meat sandwiches. He saw their skin baking brown. And he saw the yellow eyes of his wife and his children, their eyes that were never yellow before. A few tremblings shook him, but were carried off in waves of pleasant heat as he lay in the sun. He was too tired to be afraid.

161 "Cora, how long have your eyes been yellow?"

162 She was bewildered. "Always, I guess."

163 "They didn't change from brown in the last three months?"

164 She bit her lips. "No. Why do you ask?"

165 "Never mind."

166 They sat there.

167 "The children's eyes," he said. "They're yellow, too."

168 "Sometimes growing children's eyes change color."

ANALYZE MOOD

Annotate: In paragraph 160, mark the sentences that suggest a change in Harry's thinking. Think about how this change contrasts with his earlier behavior.

Draw Conclusions: How does this change affect the mood of the story and suggest what may happen next?

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169 "Maybe *we're* children, too. At least to Mars. That's a thought." He laughed. "Think I'll swim."

170 They leaped into the canal water, and he let himself sink down and down to the bottom like a golden statue and lie there in green silence. All was water-quiet and deep, all was peace. He felt the steady, slow current drift him easily.

171 If I lie here long enough, he thought, the water will work and eat away my flesh until the bones show like coral. Just my skeleton left. And then the water can build on that skeleton—green things, deep water things, red things, yellow things. Change. Change. Slow, deep, silent change. And isn't that what it is up *there?*

172 He saw the sky submerged above him, the sun made Martian by atmosphere and time and space.

173 Up there, a big river, he thought, a Martian river; all of us lying deep in it, in our pebble houses, in our sunken boulder houses, like crayfish hidden, and the water washing away our old bodies and lengthening the bones and—

174 He let himself drift up through the soft light.

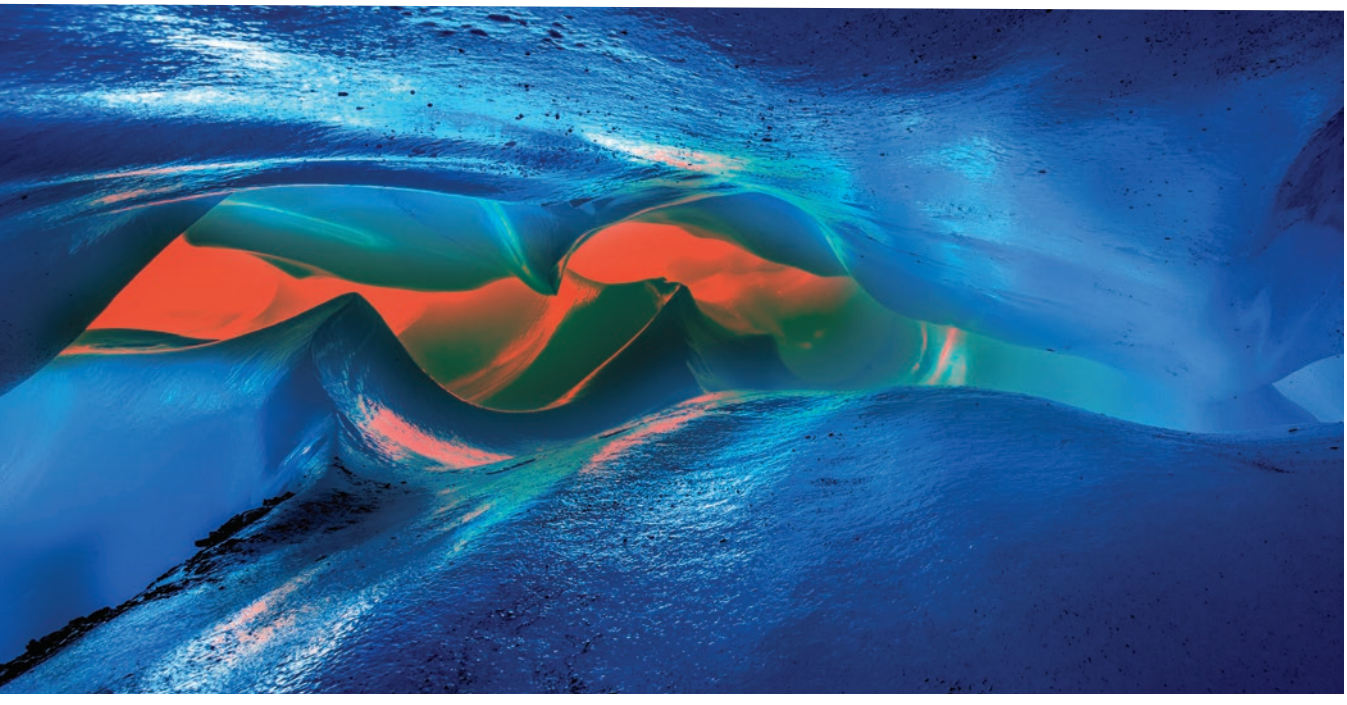
175 Dan sat on the edge of the canal, regarding his father seriously.

176 "*Utha*" he said.

177 "What?" asked his father.

178 The boy smiled. "You know. *Utha's* the Martian word for 'father.'"

179 "Where did you learn it?"



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180 "I don't know. Around. *Utha!*"

181 "What do you want?"

182 The boy hesitated. "I—I want to change my name."

183 "Change it?"

184 "Yes."

185 His mother swam over. "What's wrong with Dan for a name?"

186 Dan fidgeted. "The other day you called Dan, Dan, Dan. I didn't even hear. I said to myself, That's not my name. I've a new name I want to use."

187 Mr. Bittering held to the side of the canal, his body cold and his heart pounding slowly. "What is this new name?"

188 "Linnl. Isn't that a good name? Can I use it? Can't I, please?"

189 Mr. Bittering put his hand to his head. He thought of the silly rocket, himself working alone, himself alone even among his family, so alone.

190 He heard his wife say, "Why not?"

191 He heard himself say, "Yes, you can use it."

192 "Yaaa!" screamed the boy. "I'm Linnl, Linnl!"

193 Racing down the meadowlands, he danced and shouted.

194 Mr. Bittering looked at his wife. "Why did we do that?"

195 "I don't know," she said. "It just seemed like a good idea." They walked into the hills. They strolled on old mosaic paths, beside still pumping fountains. The paths were covered with a thin film of cool water all summer long. You kept your bare feet cool all the day, splashing as in a creek, wading.

196 They came to a small deserted Martian villa with a good view of the valley. It was on top of a hill. Blue marble halls, large murals, a swimming pool. It was refreshing in this hot summertime. The Martians hadn't believed in large cities.

197 "How nice," said Mrs. Bittering, "if we could move up here to this villa for the summer."

198 "Come on," he said. "We're going back to town. There's work to be done on the rocket."

199 But as he worked that night, the thought of the cool blue marble villa entered his mind. As the hours passed, the rocket seemed less important.

Don't forget to **Notice & Note** as you read the text.

ANALYZE MOOD

Annotate: Reread paragraphs 175–194. Mark the words that express Dan's request.

Infer: Why do you think Dan wants to make this change? How does his father's reaction show a change in the story's mood?

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recede
(rĭ-sēd´) *v.* To *recede* means to become fainter or more distant.

200 In the flow of days and weeks, the rocket **receded** and dwindled. The old fever was gone. It frightened him to think he had let it slip this way. But somehow the heat, the air, the working conditions—

201 He heard the men murmuring on the porch of his metal shop.

202 "Everyone's going. You heard?"

203 "All going. That's right."

204 Bittering came out. "Going where?" He saw a couple of trucks, loaded with children and furniture, drive down the dusty street.

205 "Up to the villas," said the man.

206 "Yeah, Harry. I'm going. So is Sam. Aren't you Sam?"

207 "That's right, Harry. What about you?"

208 "I've got work to do here."

209 "Work! You can finish that rocket in the autumn, when it's cooler."

210 He took a breath. "I got the frame all set up."

211 "In the autumn is better." Their voices were lazy in the heat.

212 "Got to work," he said.

213 "Autumn," they reasoned. And they sounded so sensible, so right.

214 "Autumn would be best," he thought. "Plenty of time, then."

215 No! cried part of himself, deep down, put away, locked tight, suffocating. No! No!

216 "In the autumn," he said.

217 "Come on, Harry," they all said.

218 "Yes," he said, feeling his flesh melt in the hot liquid air. "Yes, in the autumn. I'll begin work again then."

219 "I got a villa near the Tirra Canal," said someone.

220 "You mean the Roosevelt Canal, don't you?"

221 "Tirra. The old Martian name."

222 "But on the map—"

223 "Forget the map. It's Tirra now. Now I found a place in the Pillan Mountains—"

224 "You mean the Rockefeller Range," said Bittering.

225 "I mean the Pillan Mountains," said Sam.

226 "Yes," said Bittering, buried in the hot, swarming air. "The Pillan Mountains."

227 Everyone worked at loading the truck in the hot, still afternoon of the next day.

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228 Laura, Dan, and David carried packages. Or, as they preferred to be known, Ttil, Linnl, and Werr carried packages.

229 The furniture was abandoned in the little white cottage.

230 "It looked just fine in Boston," said the mother. "And here in the cottage. But up at the villa? No. We'll get it when we come back in the autumn."

231 Bittering himself was quiet.

232 "I've some ideas on furniture for the villa," he said after a time. "Big, lazy furniture."

233 "What about your encyclopedia? You're taking it along, surely?"

234 Mr. Bittering glanced away. "I'll come and get it next week."

235 They turned to their daughter. "What about your New York dresses?"

236 The bewildered girl stared. "Why, I don't want them any more."

237 They shut off the gas, the water, they locked the doors and walked away. Father peered into the truck.

238 "Gosh, we're not taking much," he said. "Considering all we brought to Mars, this is only a handful!"

239 He started the truck.

240 Looking at the small white cottage for a long moment, he was filled with a desire to rush to it, touch it, say good-bye to it, for he felt as if he were going away on a long journey, leaving something to which he could never quite return, never understand again.

241 Just then Sam and his family drove by in another truck.

242 "Hi, Bittering! Here we go!"

243 The truck swung down the ancient highway out of town. There were sixty others traveling in the same direction. The town filled with a silent, heavy dust from their passage. The canal waters lay blue in the sun, and a quiet wind moved in the strange trees.

244 "Good-bye, town!" said Mr. Bittering.

245 "Good-bye, good-bye," said the family, waving to it.

246 They did not look back again.

247 Summer burned the canals dry. Summer moved like flame upon the meadows. In the empty Earth settlement, the painted houses flaked and peeled. Rubber tires upon which children had swung in back yards hung suspended like stopped clock **pendulums** in the blazing air.

Don't forget to **Notice & Note** as you read the text.

ANALYZE MOOD

Annotate: In paragraphs 227–239, mark the text that shows Harry's feelings about what the family is taking to the villa.

Analyze: What effect does Harry's response have on the overall mood of the story?

pendulum
(pĕn´jə-ləm) *n.* A *pendulum* is a weight that is hung so that it can swing freely. It is used in timing the workings of certain clocks.

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NOTICE & NOTE

CONTRASTS AND CONTRADICTIONS

When you notice either a sharp contrast between what you would expect and what a character actually does, or behavior that contradicts previous behavior or well-established patterns, you've found a **Contrasts and Contradictions** signpost.

Notice & Note: Mark Harry's response to his wife in paragraphs 250–256.

Infer: How do Harry's responses contrast with his thoughts and behavior earlier in the story? Why might the character be acting this way now?

muse
(myōōz) *v.* When you *muse*, you say something thoughtfully.

248 At the metal shop, the rocket frame began to rust.

249 In the quiet autumn Mr. Bittering stood, very dark now, very golden-eyed, upon the slope above his villa, looking at the valley.

250 "It's time to go back," said Cora.

251 "Yes, but we're not going," he said quietly. "There's nothing there any more."

252 "Your books," she said. "Your fine clothes."

253 "Your *llles* and your fine *ior uele rre*," she said.

254 "The town's empty. No one's going back," he said. "There's no reason to, none at all."

255 The daughter wove tapestries and the sons played songs on ancient flutes and pipes, their laughter echoing in the marble villa.

256 Mr. Bittering gazed at the Earth settlement far away in the low valley. "Such odd, such ridiculous houses the Earth people built."

257 "They didn't know any better," his wife **mused.** "Such ugly people. I'm glad they've gone."

258 They both looked at each other, startled by all they had just finished saying. They laughed.

259 "Where did they go?" he wondered. He glanced at his wife. She was golden and slender as his daughter. She looked at him, and he seemed almost as young as their eldest son.

260 "I don't know," she said.

261 "We'll go back to town maybe next year, or the year after, or the year after that," he said, calmly. "Now—I'm warm. How about taking a swim?"

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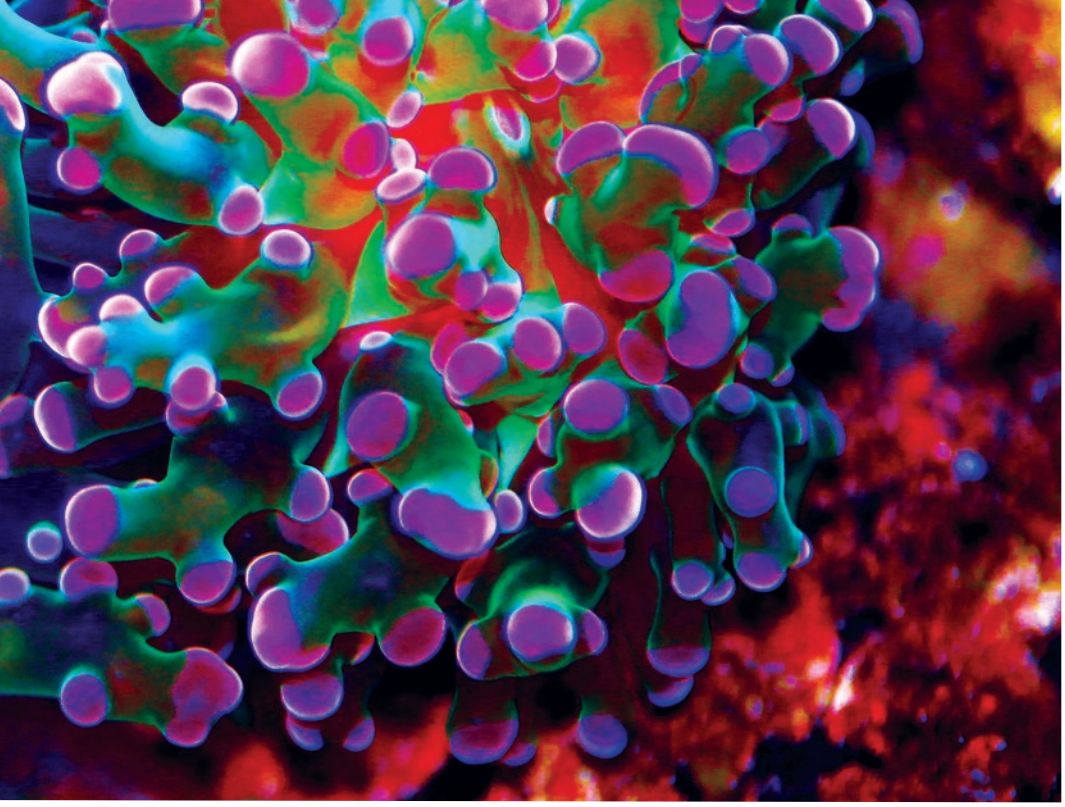

Don't forget to **Notice & Note** as you read the text.

ANALYZE SCIENCE FICTION

Annotate: Reread paragraphs 263–274. Mark the sentences that describe what the rocket men found.

Predict: Based on what you know about science fiction, what do you think will happen to the captain and the lieutenant? Remember science fiction often contains fantastical events and comments on human nature.

262 They turned their backs to the valley. Arm in arm they walked silently down a path of clear-running spring water.

263 Five years later a rocket fell out of the sky. It lay steaming in the valley. Men leaped out of it, shouting.

"We won the war on Earth! We're here to rescue you! Hey!"

264 But the American-built town of cottages, peach trees, and theaters was silent. They found a flimsy rocket frame rusting in an empty shop.

265 The rocket men searched the hills. The captain established headquarters in an abandoned bar. His lieutenant came back to report.

266 "The town's empty, but we found native life in the hills, sir. Dark people. Yellow eyes. Martians. Very friendly. We talked a bit, not much. They learn English fast. I'm sure our relations will be most friendly with them, sir."

267 "Dark, eh?" mused the captain. "How many?"

268 "Six, eight hundred, I'd say, living in those marble ruins in the hills, sir. Tall, healthy. Beautiful women."

269 "Did they tell you what became of the men and women who built this Earth settlement, Lieutenant?"

270 "They hadn't the foggiest notion of what happened to this town or its people."

271 "Strange. You think those Martians killed them?"

272 "They look surprisingly peaceful. Chances are a plague did this town in, sir."

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273 "Perhaps. I suppose this is one of those mysteries we'll never solve. One of those mysteries you read about."

274 The captain looked at the room, the dusty windows, the blue mountains rising beyond, the canals moving in the light, and he heard the soft wind in the air. He shivered. Then, recovering, he tapped a large fresh map he had thumbtacked to the top of an empty table.

275 "Lots to be done, Lieutenant." His voice droned on and quietly on as the sun sank behind the blue hills. "New settlements. Mining sites, minerals to be looked for. Bacteriological specimens[5] taken. The work, all the work. And the old records were lost. We'll have a job of remapping to do, renaming the mountains and rivers and such. Calls for a little imagination.

276 "What do you think of naming those mountains the Lincoln Mountains, this canal the Washington Canal, those hills—we can name those hills for you, Lieutenant. Diplomacy. And you, for a favor, might name a town for me. Polishing the apple.[6] And why not make this the Einstein Valley, and farther over . . . are you *listening,* Lieutenant?"

277 The lieutenant snapped his gaze from the blue color and the quiet mist of the hills far beyond the town.

278 "What? Oh, *yes,* sir!"

[5] **bacteriological specimens:** samples of different kinds of single-celled living things.
[6] **Polishing the apple:** acting in a way to get on the good side of another person.

TURN AND TALK

Get together with a partner and talk about the ending to "Dark They Were, and Golden-Eyed." What has happened to the Bitterings? Will the same thing happen to the new rocket men?

ESSENTIAL QUESTION:

Is space exploration a daring adventure or a dangerous risk?

Review your notes and add your thoughts to your Response Log.

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Assessment Practice

Answer these questions before moving on to the **Analyze the Text** section on the next page.

1. Read the excerpt from the story.

> "A river of wind submerged the house. When the windows ceased rattling Mr. Bittering swallowed and looked at the children."
> (paragraph 21)

What does the use of the word *submerged* suggest in this excerpt?

- (A) The children may drown if they leave the house.
- (B) The atmosphere around the house is heavy and dangerous.
- (C) The Martians are preparing to attack the house.
- (D) Mr. Bittering thinks the house is too noisy.

2. This question has two parts. First answer **Part A**, then **Part B**.

Part A

How is Harry's point of view different from the other people's?

- (A) Harry is concerned about being stranded on Mars.
- (B) Harry is able to hide his emotions about what is happening.
- (C) Harry is afraid of people from Earth arriving.
- (D) Harry is capable of protecting his family.

Part B

Select the sentence that supports the answer in Part A.

- (A) "And they stood looking at the green roses." (paragraph 66)
- (B) "But mostly they just idled and watched him with their yellowing eyes." (paragraph 119)
- (C) "He took a sandwich, opened it, looked at it, and began to nibble at it." (paragraph 155)
- (D) "But as he worked that night, the thought of the cool blue marble villa entered his mind." (paragraph 199)

Ed **Test-Taking Strategies**

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Analyze the Text

Support your responses with evidence from the text.

NOTICE & NOTE

Review what you **noticed and noted** as you read the text. Your annotations can help you answer these questions.

1. **ANALYZE** What words would you use to describe the overall mood of the story? Identify points in the story where the mood shifts.

2. **INTERPRET** Why does the author have the settlers change their names using the old Martian names for landmarks? How does this affect the plot?

3. **COMPARE** Why might Cora be more accepting of Mars than her husband, Harry, is? What practical matters might affect her behavior?

4. **PREDICT** Who do you think will resist change more: the captain or the lieutenant? Cite text evidence from the story to support your prediction.

5. **INTERPRET** Although this work of science fiction was originally published in 1949, some of Bradbury's comments about life in the real world or about human nature still ring true. In portraying human life on Mars, what do you think Bradbury was saying about human nature?

6. **ANALYZE** Review the **Contrasts and Contradictions** you noticed in Harry's behavior. Using an organizer, record his attitude and appearance at the beginning, middle, and end of the story.

BEGINNING	MIDDLE	END

7. **INTERPRET** What do Harry and Cora realize by the end of the selection that shifts their understanding of themselves? Explain how this **Aha Moment** affects their behavior.

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Choices

Here are some other ways to demonstrate your understanding of the ideas in this lesson.

Writing

Literary Analysis

Ray Bradbury told interviewers that he did not consider himself a science fiction writer. In light of this, do you think it is right to label "Dark They Were, and Golden-Eyed" as science fiction? Explain your answer in a three- to four-paragraph essay.

1. Review the "Analyze Science Fiction" section before the selection.
2. Introduce the topic and state your opinion.
3. Provide reasons for your opinion, referencing science fiction genre characteristics and citing text evidence.
4. To conclude, restate your opinion.

As you write and discuss, be sure to use the **Academic Vocabulary** words.

- **complex**
- **potential**
- **rely**
- **stress**
- **valid**

Media

Podcast

Imagine that you are a member of the Bittering family. You want to transmit a podcast of your first impressions of Mars to your Earth friends.

- Outline thoughts, feelings, and first experiences you want to share.
- Use vivid sensory details to describe aspects of Mars that will be unfamiliar to your listeners.

Social & Emotional Learning

Group Discussion

For much of the story, Harry Bittering is the only one who resists the physical and cultural changes occurring among the settlers. In a small group, discuss the following questions about the peer pressure Harry experiences in the story.

- Is it spoken pressure, unspoken, or both?
- Do the other settlers influence Harry through positive emotions (such as showing their own happiness) or negative emotions (such as making fun of him)?
- Why does Harry ultimately accept the viewpoint of the other settlers? Was this the right decision?

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Expand Your Vocabulary

PRACTICE AND APPLY

For each item, mark the phrase that has a connection to each vocabulary word.

1. pendulum

- ○ a writing instrument
- ○ a grandfather clock
- ○ a racing motorcycle

2. recede

- ○ a plane flying off into the distance
- ○ a plane landing on a runway
- ○ a plane parked at the gate

3. forlorn

- ○ a bitter quarrel
- ○ a heavy snowfall
- ○ a lonely child

4. idle

- ○ singers in a contest
- ○ bored workers with nothing to do
- ○ a parking lot filling with cars

5. muse

- ○ a person considering choices
- ○ a windy, rainy afternoon
- ○ a noisy rock band

6. convivial

- ○ a dog chasing a squirrel
- ○ a friendly crowd of people
- ○ a curving staircase

Vocabulary Strategy

Latin Roots

The vocabulary word *pendulum* contains the Latin root *pend*, which means "hang." This root, sometimes spelled *pens*, is found in many English words. Use context clues and your knowledge of the root's meaning to help you understand unfamiliar words.

Ed **Interactive Vocabulary Lesson: Common Roots, Prefixes, and Suffixes**

PRACTICE AND APPLY

Choose the word that best completes each sentence. Then explain to a partner how the root *pend* or *pens* relates to the meaning of the word.

suspenseful **dependent** **impending** **pendant**

1. She wears that _____ around her neck every day.
2. My choice is _____ on what you decide to do.
3. The book was so _____ that he could not put it down.
4. They could not shake off their feeling of _____ trouble.

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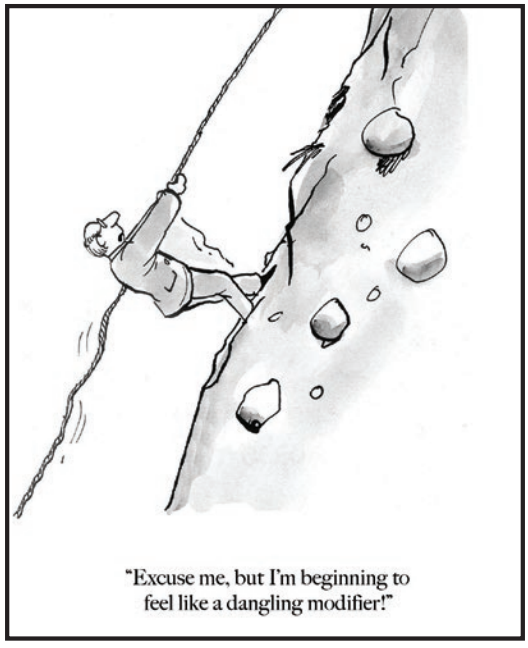
Watch Your Language!

Dangling Modifiers

A **modifier** is a word or phrase that changes the meaning of another word in a sentence. Examples are adjectives or adverbs that give more detail about a noun, a verb, or another adjective or adverb. Sometimes a modifier does not appear to modify any word in the sentence. This is an error known as a **dangling modifier**, as this cartoon humorously illustrates.



In the examples below, notice dangling modifiers and corrected sentences.

Dangling: Growing up a soft purple, Harry was startled by what he saw.
(Who or what is growing up a soft purple?)

Clear: Harry was startled to see the lawn growing up a soft purple.

Dangling: To leave her dresses behind, Laura climbed happily into the truck.
(Is leaving the dresses behind the reason that Laura climbs into the truck?)

Clear: Laura climbed into the truck, happy to leave her dresses behind.

PRACTICE AND APPLY

Mark the dangling modifier in each sentence. Rewrite the sentence to include a word or phrase that the modifier logically modifies.

Ed
Interactive Grammar Lesson: Placement of Modifiers

1. Blowing a shower of peach blossoms, he listened to the gentle sound.
2. Laying out the blueprints, preparations for building the rocket were made.
3. He watched people leaving, loaded with furniture and children.

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Martian Metropolis

Science Writing by **Meg Thacher**

ESSENTIAL QUESTION:
Is space exploration a daring adventure or a dangerous risk?

Engage Your Brain

Choose one or more of these activities to start connecting with the informational text you're about to read.

Whom Would You Send?

Imagine you're on a selection committee choosing the first five humans to go to Mars. Think about what training and talent each individual would have to possess. The individuals might be real or from your imagination. List your choices and explain each choice. Discuss choices with a partner.

A Colony on Mars

You've probably seen amazing photographs of Mars. But have you ever thought about what it would be like to live there? With your class, discuss the possible challenges to human settlement on Mars. If necessary, do brief research. Consider:

- Where exactly on Mars might the first pioneers settle?
- What kind of spacesuits will astronauts need?
- What will the first Martian shelters look like?

What Would You Bring?

Make a list of items you think would be necessary for living on Mars. Think of the necessities for survival as well for comfort. List at least five items. Discuss choices in a small group.

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Analyze Central Ideas

Informational texts often feature a web of individuals, events, and ideas. Recognizing how an individual influences events and ideas, or how an idea influences events and individuals, helps readers understand and recall **central ideas.**

In "Martian Metropolis," one central idea or concept is revealed when the author explains how the dangerous cosmic radiation will affect settlers on Mars by influencing where they live. As you read "Martian Metropolis," look for other examples of how people and ideas might interact on Mars. This will help you determine key ideas in the text.

Focus on Genre

Informational Text

- provides factual information
- includes evidence to support ideas
- contains text features to convey information
- can be presented in many forms, such as science writing, news articles, and essays

Analyze Structure

Facts and details can be organized in a variety of ways. This chart shows a few common **organizational structures.** As you read "Martian Metropolis," note the organizational structures the author uses.

STRUCTURE	EXAMPLE FROM THE SELECTION
A **classification** structure presents objects, ideas, and information in groups, or classes, based on common characteristics.	The city will need energy for heat and electricity. The best sources will be solar, geothermal, and wind, as there's no oil or gas on Mars. Settlers will also want to make fuel for trips back home. They'll likely use carbon dioxide from the Martian atmosphere to make methane gas. . . .
A **cause and effect** structure shows the relationship between events and their causes.	Because it has to produce its own air, the Martian city will be small.
An **advantages and disadvantages** structure divides ideas about a topic into the positive and negative points, or advantages and disadvantages.	Of all the planets in the solar system, Mars is the most Earth-like. It's made of rock and has a thin atmosphere. . . . The biggest danger on Mars, though, is radiation.

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Annotation in Action

Here is one reader's note about this paragraph from "Martian Metropolis." As you read the informational text, notice how details support key ideas.

It's farther from the sun than Earth, so Mars is much colder. On average, it's a bone-chilling -80° F / -62° C. The Martian day (called a "sol") is about 40 minutes longer than an Earth day; a Martian year is 668.6 sols. Its atmosphere is about 100 times thinner than Earth's, and it's 95 percent carbon dioxide. Even if Mars' atmosphere were thicker, we wouldn't be able to breathe it. Earth's atmosphere is mostly nitrogen and oxygen, with 0.04 percent carbon dioxide—a combination that's friendlier to our planet's life forms.

These details tell me living on Mars would be really difficult!

Expand Your Vocabulary

Put a check mark next to the vocabulary words that you already feel comfortable using when speaking and writing.

radiation	☐
colonize	☐
geothermal	☐

Turn to a partner and talk about the words you already know. Then, use as many words as you can in a short statement about what NASA and other agencies need to do to prepare for life on Mars. As you read "Martian Metropolis," use the definitions in the side column to learn the vocabulary words you don't already know.

Background

Meg Thacher is an astronomy instructor at Smith College in Northampton, Massachusetts. In addition, she serves as the academic director for the college's Summer Science and Engineering Program, offered to high school girls who are interested in science, engineering, and medicine. Thacher explains her passion for science writing by saying, "I love all things science, and I love explaining it in terms that kids can understand."

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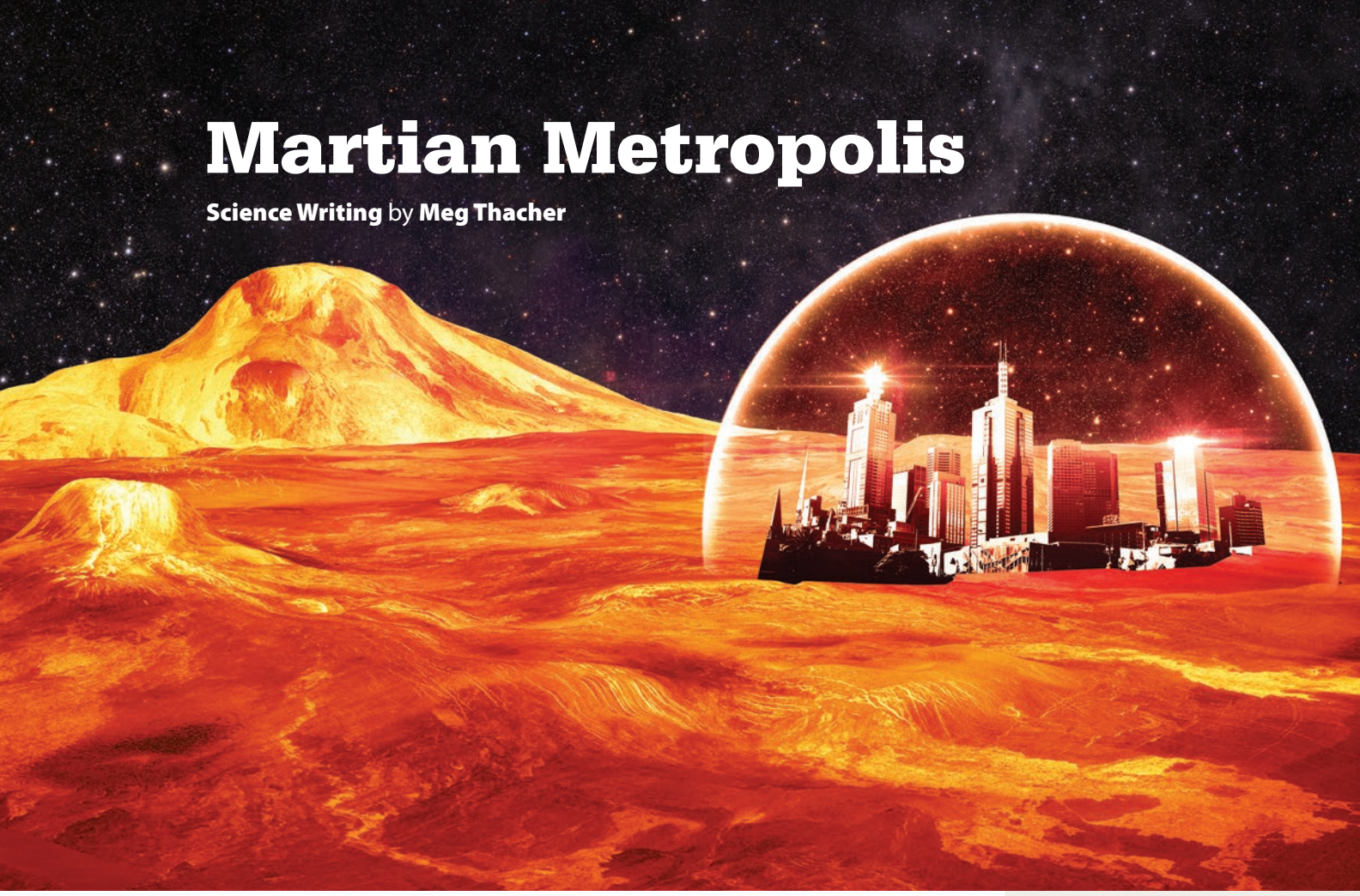
Martian Metropolis

Science Writing by **Meg Thacher**



Learn what life would be like if humans tried to live on the Red Planet.

NOTICE & NOTE
As you read, use the side margins to make notes about the text.

1 NASA plans to send humans to Mars in the 2030s, and several private entities aim to send settlers to live on Mars permanently.

2 There are several reasons to create an off-planet colony. One is survival of our species. "We never know what will happen to threaten the habitat. This could be our life raft," says Darby Dyar, an astronomy professor at Mount Holyoke College and a member of the Mars *Curiosity* rover team. "There's also the cool factor," she says. "Who would *not* want to live on Mars?"

3 Scientists living on Mars can study the planet up close better than rovers can. They can compare it to Earth and other planets. They can study its atmosphere—and humans' effect on that atmosphere. If they find evidence for life on Mars, whether past or present, that will tell humans we're not alone in the universe.

NOTICE & NOTE
WORD GAPS

When you notice vocabulary that is unfamiliar, you've found a **Word Gaps** signpost.

Annotate: Mark any unfamiliar words in paragraph 2.

Infer: Can you find clues in the paragraph that help you understand these words?

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NOTICE & NOTE
NUMBERS AND STATS

When you notice the use of specific quantities or comparisons to show amounts, size, or scale, you've found a **Number and Stats** signpost.

Notice & Note: In paragraph 5, mark the statistics the author provides about Mars.

Analyze: Do these numbers help prove a point? How?

radiation
(rā´dē-ā´shən) *n.* *Radiation* is energy transmitted in the form of waves or particles.

colonize
(kŏl´ə-nīz´) *v.* When you *colonize*, you send a group of people to a new place to establish a colony or settlement.

Fourth Rock from the Sun

4 Of all the planets in the solar system, Mars is the most Earth-like. It's made of rock and has a thin atmosphere. The scenery is beautiful but also strange, with craters and sand dunes, dust, and scattered rocks. It has massive landforms—the tallest mountains and deepest canyons in the solar system—all under a pink sky.

5 It's farther from the sun than Earth, so Mars is much colder. On average, it's a bone-chilling -80° F/-62° C. The Martian day (called a "sol") is about 40 minutes longer than an Earth day; a Martian year is 668.6 sols. Its atmosphere is about 100 times thinner than Earth's,[1] and it's 95 percent carbon dioxide. Even if Mars's atmosphere were thicker, we wouldn't be able to breathe it. Earth's atmosphere is mostly nitrogen and oxygen, with 0.04 percent carbon dioxide—a combination that's friendlier to our planet's life forms.

6 The biggest danger on Mars, though, is **radiation.** Mars has no magnetic field to protect humans from cosmic rays, which are high-energy particles from the sun and other sources. On Mars, cosmic radiation is much higher than it is on Earth. This can cause serious damage to DNA, which increases the risk of cancer. The danger would decrease if you burrowed 16 feet (5 meters) under the surface of the Red Planet.[2] The soil overhead would provide about the same amount of protection as Earth's atmosphere.

Living Off the Land

7 Sending stuff to Mars is very expensive. The cheapest way to **colonize** will be to make everything there. "It's really all about the resources," says Dyar. "If we find things there that allow us to sustain human life, then we can settle there." Mars has plenty of metals and rock, and probably lots of water, but no wood or petroleum (which is used to make gasoline, plastic, and many other useful products). The settlers could make bricks from local dirt. Mars has plenty of silicon and iron, elements that will allow people to produce glass and steel.[3] And of course, everything sent to Mars will stay on Mars. Martian citizens will be really good at recycling.

[1] "The Terrestrial Planets," National Oceanic and Atmospheric Administration, https://www.esrl.noaa.gov/gmd/outreach/info_activities/pdfs/TBI_terrestrial_planets.pdf.
[2] "Mission to Mars Would Double Astronauts' Cancer Risk," U.S. National Library of Medicine
[3] "Oxygen in the Martian atmosphere: Regulation of PO2 by the deposition of iron formations on Mars," NASA Technical Reports Server, Nov 7, 1995

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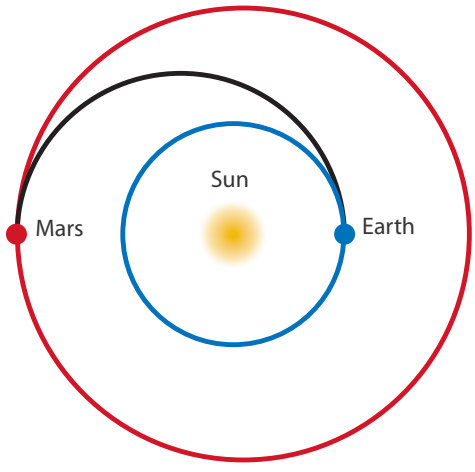
8 Settlers will need to grow food. Mars has dirt, but it doesn't have soil. Soil contains microbes that help plants grow. Fortunately, humans will take those organisms along with them! Poop makes excellent fertilizer, so the sewage treatment plant will be near the greenhouses. Martians will most likely eat a vegan diet. Animals are hard to transport, and it takes much less energy to grow plants than to raise animals. Plants also use up carbon dioxide and produce oxygen, which people need to breathe.

9 The city will need energy for heat and electricity. The best sources will be solar, **geothermal,** and wind, as there's no oil or gas on Mars. Settlers will also want to make fuel for trips back home. They'll likely use carbon dioxide from the Martian atmosphere to make methane gas. To do this, they'll need hydrogen. They could bring it from Earth or get it from water found on Mars.

Smaller Is Better

10 Because it has to produce its own air, the Martian city will be small. At first, residents will probably live underground to protect themselves against cosmic radiation. They'll work to develop radiation-blocking glass or plastic. Once that's in place, settlers can live above ground in brick buildings with windows, or even under a dome or tent.

11 To limit exposure to radiation, scientists will send rovers and drones out exploring and will use the information to decide where to send human explorers. Temporary shelters and labs will pop up all over the planet for short-term science projects.



The black line traces the most efficient path from Earth to Mars. Space travelers will need to wait as long as two years for the planets' orbits to align.

ANALYZE CENTRAL IDEAS

Annotate: Mark where the sewage treatment plant will be located on Mars.

Analyze: Why will it be located here?

geothermal
(jē´ō-thûr´məl) *adj. Geothermal* relates to the internal heat of Earth.

ANALYZE STRUCTURE

Annotate: Mark the subheads on pages 242 and 243.

Analyze: Which main organizational structure is the author using? How can you tell?

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12 Wealthy tourists might visit the Red Planet, but you won't have to be rich or a scientist to live on Mars. The city will need farmers to grow crops, cooks, people to run the spaceport and sewage plant, trash collectors, doctors and nurses—the list goes on. Some jobs can be done by machines, which use fewer resources than human workers. So add robot mechanic to that list of careers!

All Work and No Play?

13 Colonists will keep busy with work, but they'll want entertainment too. They can venture outside for short sightseeing trips. They'll have television, radio, and movies—some transmitted from Earth, some made right on Mars. They can read and do crafts. Colonists will probably make up new sports that take advantage of Mars's low gravity. Zip lines, rock climbing, and trampolines will be popular.

14 But travel will be hard. The most fuel-efficient trip back to Earth (using gravity to do most of the work) will take around six to eight months. Earth and Mars are properly aligned for this trip for about 20 days every 26 months. Travelers in a spaceship will experience more radiation than people are exposed to on Earth. Their muscles will weaken unless engineers create "artificial gravity" by spinning the ship. It adds up to a lot of wear and tear; humans will keep trips to a minimum.

15 But people on Mars will communicate with Earth pretty often. Because Earth and Mars are so far apart, signals are delayed by up to 24 minutes. Communication will mostly resemble email. Jay Dickson, a planetary geologist at Brown University, has lived at Antarctica's isolated McMurdo Station. "Just being able to send pictures back and forth is great for morale," Dickson explains.

16 A colony on Mars will be humankind's first steps in expanding our reach within the solar system and beyond.

The author wishes to acknowledge that space exploration experts were consulted for this article.

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TURN AND TALK

With a partner, discuss what people on Earth could do to support the morale of a Martian colony.

ESSENTIAL QUESTION:

Is space exploration a daring adventure or a dangerous risk?

Review your notes and add your thoughts to your Response Log.

Assessment Practice

Answer these questions before moving on to the **Analyze the Text** section on the following page.

1. This question has two parts. First answer **Part A**, then **Part B**.

Part A

Why does the author include the section called "Living Off the Land" in the text?

(A) to prove that colonizing another planet is possible

(B) to show that it will be expensive to live on Mars

(C) to convince readers that people should not farm on Mars

(D) to explain that colonists will have to make what they need

Part B

How does the author elaborate on the ideas in this section?

(A) by including statistics to explain the conditions colonists face

(B) by describing the causes and effects of colonization on Mars

(C) by classifying the needs of colonists into categories

(D) by including graphic elements that clarify complex ideas

2. How does paragraph 12 show that there will be a need for many different skills on Mars?

(A) It includes a list of jobs that will be available on Mars.

(B) It explains why resources on Mars are abundant.

(C) It shows that machines can do most of the work on Mars.

(D) It suggests that scientists and tourists will be the first on Mars.

Ed Test-Taking Strategies

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Analyze the Text

Support your responses with evidence from the text.

NOTICE & NOTE

Review what you **noticed and noted** as you read the text. Your annotations can help you answer these questions.

1. **EXPLAIN** Why does Mars appear to be the better place to establish a colony rather than another planet?

2. **IDENTIFY** What structure does the author use in the section "Fourth Rock from the Sun"? Fill in the chart with one example of that structure.

STRUCTURE	EXAMPLE

3. **CITE EVIDENCE** What natural resources does Mars have? Use evidence from the text to explain how settlers could use the natural resources of Mars to build a colony.

4. **DRAW CONCLUSIONS** How does the structure of the section "Smaller Is Better" help develop the key ideas in the article?

5. **EVALUATE** How does the author's use of **Numbers and Stats** contribute to the article?

6. **EXPLAIN** Look back at paragraph 8. Why would settlers have a vegan diet? What, if any, **Word Gaps** did you identify that helped you answer this question?

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Choices

Here are some other ways to demonstrate your understanding of the ideas in this lesson.

Writing

Fake Texts

Imagine you're part of a special group of Earthlings assigned to communicate with the first people on Mars to help keep up their spirits. Write a text-message conversation between you and a Martian settler who shares details about an interesting day in the Martian colony. Make sure the messages

- reveal details of this friendly conversation
- include words of support
- give a glimpse into Martian daily living

As you write and discuss, be sure to use the **Academic Vocabulary** words.

- complex
- potential
- rely
- stress
- valid

Media

Timeline

Work with a partner to research and create an annotated timeline for actual Mars missions.

- Determine key events that are most important to include in your timeline.
- Use a computer or poster board to create the timeline. List the key dates for each event along with a brief description. Consider including diagrams and other visuals that you create or download from the NASA website.
- Share your timeline with another pair. Discuss the similarities and differences in your timelines, and note what most surprises you.

Social & Emotional Learning

Research Becoming an Astronaut

Each year thousands of people submit applications to NASA, but only a handful are chosen as suitable candidates. What sorts of people are best able to face the dangers of space? In small groups, explore and discuss the following:

- Find out about NASA's selection process. Who decides who has the right stuff?
- What are the basic qualifications? What's considered the best background?
- Briefly research resilience training, which is designed to help astronauts tolerate physical discomfort, deprivation, and other stressful challenges.

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Expand Your Vocabulary

PRACTICE AND APPLY

Mark the letter of the answer to each question. Then, explain your responses.

1. Which of the following is a source of **geothermal** energy?
   - **a.** fluids and rock found deep in Earth's interior
   - **b.** rushing rivers, streams, and ocean waves
2. Which place could people still **colonize?**
   - **a.** Antarctica
   - **b.** Australia
3. Where are you more likely to be exposed to intense **radiation?**
   - **a.** in outer space
   - **b.** in a desert

Vocabulary Strategy

Greek Roots

Ed

Interactive Vocabulary Lesson: Common Roots, Prefixes, and Suffixes

A **root** is a word part that came into English from an older language, such as ancient Latin or Greek. The word *atmosphere* in "Martian Metropolis" comes from two Greek roots: *atmos* (Greek for "steam or vapor") and *sphaira* (Greek for "globe or ball"). The root *sphere* also appears in other English words related to the earth. One example is *troposphere,* which is a layer of Earth's atmosphere.

PRACTICE AND APPLY

Use context clues and your knowledge of the root *sphere* to write a likely meaning for each bold word. Use a print or online dictionary to confirm your word meanings.

1. For people in the southern **hemisphere,** winter falls in the months of June, July, and August.
2. To avoid turbulence, jets often fly in the lower part of the **stratosphere.**
3. The **hydrosphere** is made up of oceans, rivers, lakes, and streams.

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Watch Your Language!

Capitalization

Interactive Grammar Lesson: Places and People

In your writing, you need to apply the rules of capitalization to proper nouns—the names of specific people, places, and things, including organizations and places for specialized research.

The chart below shows proper nouns that require capitalization. When organizations are abbreviated, their abbreviations are also capitalized.

CAPITALIZATION OF PROPER NOUNS	
Organizations	National Aeronautics and Space Administration (NASA) Jet Propulsion Laboratory (JPL)
Places	McMurdo Station Antarctica
Planets	Venus Earth Mars
Spacecraft	Mars rovers *Spirit* and *Opportunity*

PRACTICE AND APPLY

Rewrite each sentence, capitalizing proper nouns. Consult reference materials for terms or titles that are unfamiliar to you.

1. The united nations (un) headquarters is in new york city.
2. In January 2006, NASA launched the spacecraft new horizons on a mission to explore pluto.
3. The space shuttle was launched from the kennedy space center at cape canaveral, florida.
4. Astronauts routinely conduct spacewalks from the international space station.

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Challenges for Space Exploration

Argument by **Ann Leckie**

ESSENTIAL QUESTION:
Is space exploration a daring adventure or a dangerous risk?

Engage Your Brain

Choose one or more activities to start connecting with the argument you're about to read.

Space-Related Inventions

The science of space travel has led to amazing improvements on Earth in areas such as medicine, transportation, public safety, and even recreation. Do brief research about any inventions we use today that are connected to the imaginative problem-solving of space travel. Record your findings here.

Check Off Challenges

The possibility of exploring space is exciting—but dangerous, too. List what you consider the main challenges of space exploration. Then compare your list with two or three classmates.

Pop-Culture Connection

Visit NASA.gov to see posters like these. In the distant past, eye-catching posters were created to encourage travel on Earth and recruitment in military services. In recent years, space posters were created to capture the spirit of travel to Mars and other planets. With a partner, take turns examining posters and talk about why they are appealing or even inspiring.

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Analyze Author's Purpose

Purpose is an author's reason for writing a text. In an argument, the purpose is to persuade. The author presents a **claim**—a viewpoint or position on an issue—and then supports it with reasons and evidence.

Some arguments begin by clearly stating a claim. Others imply a claim through the presentation of information and **rhetoric—**language used to appeal to an audience. One aspect of rhetoric is **word choice.** Word choice helps to shape both tone and voice in a text.

Focus on Genre

Argument

- presents and defends a claim
- provides reasons to support the claim and factual evidence to support the reasons
- uses persuasive language
- can be formal or informal

WORD CHOICE	EXAMPLE FROM SELECTION
Tone is the author's attitude toward a subject—for example, serious, lighthearted, or (as in this example) inspirational.	It's a huge, dangerous, maybe impossible project. But that's never stopped humans from trying anyway.
Voice is an author's unique use of language that allows a reader to "hear" a human personality in the author's work.	. . . one good meteor strike and we all join the non-avian dinosaurs. And have you noticed the weather lately?

Analyze Repetition

Repetition is one of the **rhetorical devices**—specific ways of using language—authors use to emphasize key ideas, convey tone, and encourage an emotional response in readers. In this example from "Challenges for Space Exploration," repetition of the word *there* emphasizes the idea of going into space.

> **What's up there? Could we go there? Maybe we could go there.**

As you read "Challenges for Space Exploration," look for other examples of repetition the author uses to develop her argument.

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Annotation in Action

In the model, you can see one reader's notes about one paragraph in "Challenges for Space Exploration." As you read, note how the author reveals her purpose for writing.

I could tell you that it might be good for us to unite behind a project that doesn't involve killing one another, that does involve understanding our home planet and the ways we survive on it and what things are crucial to our continuing to survive on it.

Repetition and contrast make the statement memorable.

Expand Your Vocabulary

Put a check mark next to the vocabulary words that you already feel comfortable using when speaking or writing.

infinitely	☐
entail	☐
crucial	☐
habitat	☐

Turn to a partner and talk about the vocabulary words you already know. Then, use as many words as you can to express your opinion about the biggest challenges for space travel. As you read "Challenges for Space Exploration," use the definitions in the side column to learn the vocabulary words you don't already know.

Background

Ann Leckie (b. 1966) is an award-winning science fiction author. She has published many short stories but perhaps is best known for her novel *Ancillary Justice*, the first volume in the highly praised *Imperial Radch* series. The selection you are about to read, however, is persuasive nonfiction—an argument. It is Leckie's introduction to a feature in *Wired* magazine that explains problems humans face when they leave the relative safety of Earth.

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Challenges for Space Exploration

Argument by **Ann Leckie**

The author ponders whether going to outer space is worth the effort.

NOTICE & NOTE
As you read, use the side margins to make notes about the text.

1 Thousands of years ago, when our ancestors came to the sea, they built boats and sailed tremendous distances to islands they could not have known were there. Why?

2 Probably for the same reason we look up at the moon and the stars and say, "What's up there? Could we go there? Maybe we could go there." Because it's something human beings do.

3 Space is, of course, **infinitely** more hostile to human life than the surface of the sea; escaping Earth's gravity **entails** a good deal more work and expense than shoving off from the shore. But those boats were the cutting-edge technology of their time. Voyagers carefully planned their expensive, dangerous journeys, and many of them died trying to find out what was beyond the horizon. So why keep doing it?

4 I could tell you about spinoff technologies, ranging from small products of convenience to discoveries that might feed millions or prevent deadly accidents or save the lives of the sick and injured.

infinitely
(ĭn´fə-nĭt-lē) *adv. Infinitely* means to a great extent, or with no limits.

entail
(ĕn-tāl´) *v.* To *entail* means to have or require.

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An interplanetary vehicle orbits Mars.

ANALYZE REPETITION

Annotate: Mark the clause that is repeated in paragraphs 4–8.

Analyze: How does the author's use of repetition help her support her claim?

ANALYZE AUTHOR'S PURPOSE

Annotate: Mark the words and phrases in paragraph 8 that help shape the tone of the paragraph.

Interpret: What tone, or attitude toward the subject, does the writing convey?

crucial
(krōō´shəl) *adj.* Something that is *crucial* is extremely important or significant.

habitat
(hăb´ĭ-tăt´) *n.* In this instance, a *habitat* is a structure that provides a controlled environment for living in very hostile or even deadly locations.

ESSENTIAL QUESTION:
Is space exploration a daring adventure or a dangerous risk?

Review your notes and add your thoughts to your Response Log.

I could tell you that we shouldn't keep all our eggs in this increasingly fragile basket—one good meteor strike and we all join the non-avian dinosaurs. And have you noticed the weather lately?

I could tell you that it might be good for us to unite behind a project that doesn't involve killing one another, that does involve understanding our home planet and the ways we survive on it and what things are **crucial** to our continuing to survive on it.

I could tell you that moving farther out into the solar system might be a good plan, if humanity is lucky enough to survive the next 5.5 billion years and the sun expands enough to fry the Earth.

I could tell you all those things: all the reasons we should find some way to live away from this planet, to build space stations and moon bases and cities on Mars and **habitats** on the moons of Jupiter. All the reasons we should, if we manage that, look out at the stars beyond our sun and say, "Could we go there? Maybe we could go there."

It's a huge, dangerous, maybe impossible project. But that's never stopped humans from trying anyway.

Humanity was born on Earth. Are we going to stay here? I suspect—I hope—the answer is no.

TURN AND TALK

What one word would you use to describe this argument? Discuss descriptions with a partner.

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Assessment Practice

Answer these questions before moving on to the **Analyze the Text** section on the following page.

1. Read the excerpt from paragraph 3 of the argument.

> But those boats were the cutting-edge technology of their time. Voyagers carefully planned their expensive, dangerous journeys, and many of them died trying to find out what was beyond the horizon.

How does this excerpt contribute to the development of the author's ideas?

- (A) by tracing the history of human sea exploration
- (B) by suggesting that it is human nature to be explorers
- (C) by describing the dangers associated with space exploration
- (D) by discussing the causes and effects of cutting-edge technology

2. This question has two parts. First answer **Part A**, then **Part B**.

Part A

What is the purpose of the text?

- (A) to discuss the problems with life on Earth
- (B) to discuss the reasons human beings explore
- (C) to convince readers that they should try to improve Earth
- (D) to convince readers that space exploration is critical to humanity

Part B

How does the author of the text convey a purpose?

- (A) by explaining how life on Earth is fragile
- (B) by discussing technologies that could improve life
- (C) by listing the reasons that humans should explore space
- (D) by giving examples of how human beings have explored Earth

Ed **Test-Taking Strategies**

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Analyze the Text

Support your responses with evidence from the text.

NOTICE & NOTE

Review what you noticed and noted as you read the text. The annotations can help you answer the questions.

1. **ANALYZE** What claim does the author make in her argument? Where is that claim stated most clearly?

2. **SUMMARIZE** In the chart, describe some of the reasons the author gives in support of her claim.

AUTHOR'S CLAIM	AUTHOR'S REASONS

3. **ANALYZE** What tone does the author develop in paragraphs 6 and 7? How does word choice help shape that tone?

4. **INFER** How does the author's use of repetition convey tone, or her attitude toward space exploration? How does it help her achieve her purpose?

5. **EVALUATE** Does the author's voice, or unique use of language, make her argument more or less effective? Explain.

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Choices

Here are some other ways to demonstrate your understanding of the ideas in this lesson.

Writing

Write a Poem

Write a narrative poem in which an astronaut speaker considers the risks and sacrifices that she or he would face on a space mission.

- Write notes about the narrator, other characters, the conflict, and the resolution that you want to present in your poem.
- Think about the key idea or message you want your speaker or poem to express.
- Include repetition, which can add drama and emphasize your ideas.

As you write and discuss, be sure to use the Academic Vocabulary words.

- **complex**
- **potential**
- **rely**
- **stress**
- **valid**

Media

Chart the Risks

Work with a partner to research some of the risks involved in going into space. Once gathered, share your information with another pair of students.

- Use several sources and record the information you find in chart form.
- In the first column of your chart, list risks such as *Takeoff, Radiation, Zero Gravity,* and others.
- In the second column, list problems associated with the risks.
- In the third column, explain how scientists and engineers might be working to reduce the risks.

Social & Emotional Learning

Examine Exploration

From the earliest times in human history, people have confronted new frontiers. With your class, discuss the rewards and challenges of exploration and the necessary qualities of explorers, starting with courage. Consider these questions:

- What qualities did early explorers (such as the explorers of the Americas) need to make their dangerous journeys? What impact did their explorations have?
- What challenges do space explorers face? What benefits might these future explorers bring?

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Expand Your Vocabulary

PRACTICE AND APPLY

Write the vocabulary word asked for in each question. Be prepared to explain your response.

infinitely	entail	crucial	habitat

1. Which word goes with *environment*? _____
2. Which word goes with *limitless*? _____
3. Which word goes with *require* and *involve*? _____
4. Which word goes with *important*? _____

Vocabulary Strategy

Word Origins

Ed

Interactive Vocabulary Lesson: Understanding Word Origins

When you study a word's history and origin, you can find out when, where, and how the word came to be used.

PRACTICE AND APPLY

Follow these steps to record the word orgin, or etymology, of the words in the chart below.

- Look up the word in a print or digital dictionary.
- Find the word origin, or etymology, of the word after the definition(s). A print dictionary includes a section that explains how the etymology is noted and what the abbreviations mean.
- Write the origin of the word and its original meaning in the chart below. Is the word's current meaning related to its original meaning? If so, explain how.

WORD	WORD ORIGIN/MEANING
infinitely	
entail	
crucial	

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Watch Your Language!

Commas After Introductory Phrases

An introductory phrase is a group of words that comes at the beginning of a sentence and lacks a subject and verb. An introductory phrase provides more information about the main part of a sentence. Common types of introductory phrases are shown in the chart.

Interactive Grammar Lesson: More Uses of the Comma

TYPE OF INTRODUCTORY PHRASE	EXAMPLE
Appositive	A destination for space tourism, Mars could feature resorts with hotels.
Infinitive	To ensure survival, we must continue to explore space.
Participial	Working in space, robots and other machines can perform tasks that are too dangerous for humans.
Prepositional	Without a doubt, the long-term effects of zero gravity are a health risk for astronauts.

Each introductory phrase is separated from the rest of the sentence by a comma. The comma signals a pause and helps to prevent confusion.

PRACTICE AND APPLY

These sentences include introductory phrases that need to be punctuated with commas. Read each sentence and insert the comma where necessary.

1. Having performed the experiments Anita recorded her findings.
2. Without better protection from radiation people could not possibly live on Mars.
3. Outside the laboratory five rockets blasted off and flew for about a mile.

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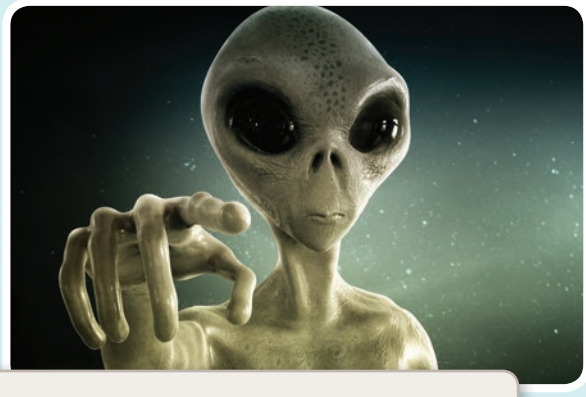
What If We Were Alone?

Poem by **William Stafford**

ESSENTIAL QUESTION:
Is space exploration a daring adventure or a dangerous risk?

Engage Your Brain

Choose one or more activities to start connecting with the poem you're about to read.

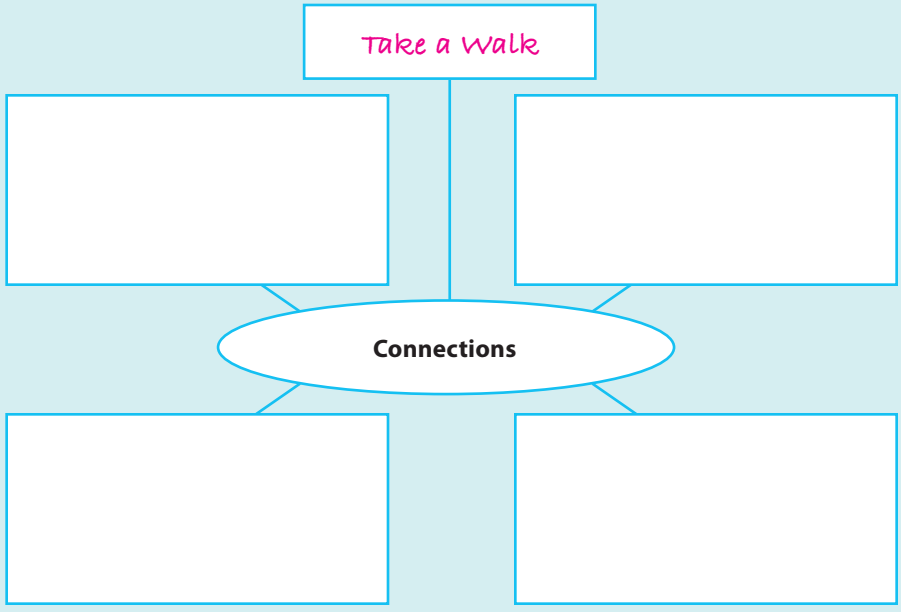


Send Your Signal

Do you think there's intelligent life beyond Earth? Raise your index finger if your answer is no. If your answer is yes, raise three to five fingers, depending on how strongly you believe. Briefly discuss your views with your class.

Universal Connection

Think about any moments when you've been lonely or a little down. What helped you feel connected to the world around you? With a partner, fill in a web like the one below with people or activities that help you feel connected. One example is given.



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Analyze Form

"What If We Were Alone?" is an example of **free verse**, a poem without regular rhyme or rhythm, and without a fixed stanza pattern or line length. Poets who use free verse are free to choose poetic elements that stress an idea or highlight a mood. They may use **stanzas**, or groups of lines), like paragraphs, to change moods and shift topics. They may use line breaks to emphasize words or ideas.

Free-verse poetry generally follows the rhythms of natural speech. Read "What If We Were Alone?" and think about the choices the poet made in line breaks, line lengths, rhythm, and word choice. Write what you notice and think about each stanza below.

STANZA 1	
STANZA 2	
STANZA 3	

Focus on Genre

Poetry

- a form of literature structured into short lines, often arranged into groups (stanzas)
- often focuses on feelings, and uses words and other elements to create images in readers' minds
- often features sound devices that help create meaning
- includes different line lengths and breaks to help express ideas and themes

Analyze Theme

Poems often have a **theme,** or a lesson about life or human nature that the poet shares with the reader. A theme is rarely stated directly at the beginning or end of a poem. It is up to you, the reader, to read closely (several times, if possible, and maybe aloud as well as silently) and think carefully about questions such as these:

- Does the title of the poem hint at an important idea?
- What seems to be the main subject of the poem?
- If the poem has several **stanzas,** how does the main idea of each stanza relate to the main idea of the other stanzas?
- Are there words or phrases that are repeated or that stand out?
- What images come to mind as you read the poem?

As you think about answers to these questions, ask yourself, "What big message about life, or about human nature, is the poem trying to tell me?" Your response probably will be a theme—and possibly the main theme—of the poem.

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Annotation in Action

Here is one reader's note about the first stanza of "What If We Were Alone?" As you read, consider how the poet develops a theme.

What if there weren't any stars?
What if only the sun and the earth
circled alone in the sky? What if
no one ever found anything outside
this world right here?—no Galileo
could say, "Look—it is out there,
a hint of whether we are everything."

The poet includes a made-up quotation about space. The theme may have something to do with a lesson we can learn from space.

Background

William Stafford (1914–1993) was born in Hutchinson, Kansas. He attended the University of Kansas and earned a BA and MA. He later earned a PhD from the University of Iowa. *Traveling Through the Dark*, his first major collection of poems, was published in 1962 and won the National Book Award in 1963. Many of Stafford's poems have roots in the natural world he experienced in the West, and they focus on the lessons that nature can teach.

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What If We Were Alone?

Poem by **William Stafford**

This poem explores how we feel a connection to the universe.

NOTICE & NOTE
As you read, use the side margins to make notes about the text.

What if there weren't any stars?
What if only the sun and the earth
circled alone in the sky? What if
no one ever found anything outside
this world right here?—no Galileo
could say, "Look—it is out there,
a hint of whether we are everything."

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ANALYZE FORM

Annotate: Mark the line breaks in lines 8 and 13.

Analyze: What idea is emphasized by each line break? What is the poet contrasting with these line breaks?

ANALYZE THEME

Annotate: In line 15, mark something found in space and something found on Earth.

Draw Conclusions: Does the poem's theme relate only to space? Explain.

Look out at the stars. Yes—cold
space. Yes, we are so distant that
the mind goes hollow to think it.
But something is out there. Whatever
our limits, we are led outward. We glimpse
company. Each glittering point of light
beckons: "There is something beyond."

The moon rolls through the trees, rises
from them, and waits. In the river all
night a voice floats from rock
to sandbar, to log. What kind of listening
can follow quietly enough? We bow, and
the voice that falls through the rapids
calls all the rocks by their secret names.

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TURN AND TALK

How startling to you is the idea of a world with no stars in the sky? Discuss your thoughts with a classmate.

ESSENTIAL QUESTION:

Is space exploration a daring adventure or a dangerous risk?

Review your notes and add your thoughts to your Response Log.

Assessment Practice

Answer these questions before moving on to the **Analyze the Text** section on the following page.

1. This question has two parts. First answer **Part A**, then **Part B**.

Part A

Which word best describes the mood of the poem?

(A) frightening
(B) mysterious
(C) gloomy
(D) romantic

Part B

Which line or lines from the poem most clearly contribute to this mood?

(A) line 1
(B) line 8
(C) lines 9–10
(D) lines 13–14

2. Which statement reflects most clearly what is suggested by line 20 of the poem?

(A) Earth is deeply connected to space.
(B) The moon causes Earth to go silent.
(C) Mysterious things happen in nature.
(D) Nature is powerful and always present.

Ed
Test-Taking Strategies

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Analyze the Text

Support your responses with evidence from the text.

NOTICE & NOTE

Review what you **noticed and noted** as you read the text. The annotations can help you answer the questions.

1. **INFER** What phrase is repeated in the title and the questions in the first stanza? What does this repetition indicate about the speaker?

2. **INTERPRET** In line 15, the poet repeats the sound of *r* in "rolls" and "rises." How does this repetition affect the poem's mood?

3. **COMPARE** How does the poet suggest that both space and Earth are mysterious?

4. **ANALYZE** In the third stanza, how does the poet suggest that Earth and space are connected?

5. **DRAW CONCLUSIONS** What do you think is the theme of "What If We Were Alone?" Why do you think so? Use the chart to fill in your thoughts.

THEME	EXPLANATION

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Choices

Here are some other ways to demonstrate your understanding of the ideas in this lesson.

Writing

Write a Poem

Imagine that an intelligent life form witnesses the arrival of a group of human space explorers. Create a poem from the life form's point of view about the newcomers' arrival. The poem may use rhyme and rhythm, or it may be in free verse.

1. Decide whether the life form is curious, frightened, or angry about the newcomers. Use words that express emotions.
2. Consider how to include the life form's observations of humans.
3. Draft and revise your poem. Consider the specific effects of the words and the poem's theme.

As you write and discuss, be sure to use the **Academic Vocabulary** words.

- **complex**
- **potential**
- **rely**
- **stress**
- **valid**

Media

Space-Related Memes

A **meme** is a visual idea on social media that can take the form of a video or image with text. Create outer-space memes to lighten up the topic of space. Pair up with a partner to generate some fresh and funny ideas.

- Think about the impressions space makes on you. Maybe you find it fascinating, inspiring, or downright frightening.
- Write the text for your meme. Find a picture that works with your text. Use digital media to combine them. (Meme-generating apps are available online.)
- Memes can change as they spread from person to person and spark new ideas. Share your meme and invite others' reactions.

Research

Astronomy

Astronomy is the scientific study of things that exist beyond Earth's atmosphere. With a partner, research different aspects of astronomy. In a small group, compare your findings. Investigate:

- methods used to study the universe in both ancient times and today
- three topics that astronomers study
- two questions that astronomers try to answer

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MEDIA

Seven Minutes of Terror

Video by the **National Aeronautics and Space Administration**

ESSENTIAL QUESTION:
Is space exploration a daring adventure or a dangerous risk?

Engage Your Brain

You're about to watch a video about the landing of NASA'S rover *Curiosity* on Mars. Think about the title of this video. What might NASA's *Curiosity* team have experienced that led NASA to include *terror* in the title? With a partner or in a small group, make predictions about how *Curiosity* is linked with terror.

Background

The people of the **National Aeronautics and Space Administration** (NASA) have always felt pressure, including the pressure of time. NASA had to detemine whether humans could survive in space before it sent anyone to the moon. It took NASA about a decade, but in 1969, American astronauts Neil Armstrong and Buzz Aldrin became the first humans to set foot on the moon. NASA went on to establish the space-shuttle program, partner with space agencies from multiple countries on the International Space Station, and explore our solar system with orbital telescopes. NASA's technological innovations continue to lead the world in space exploration and to improve life on Earth, especially in the areas of air travel and weather forecasting.

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Analyze Video

The **purpose,** or intent, of an informational video is to explain a topic. The video's creator combines visual and sound elements to meet this purpose. The creator may also use these elements to express feelings and thoughts about a topic.

Focus on Genre
Media

- often conveys information
- may target a general or specific audience
- frequently includes experts or eyewitnesses who provide explanations and key insights
- includes television broadcasts, newspapers, videos, magazines, and the internet

Visual elements include the images, the style of the images, and the ways in which the elements work together.

ANIMATION	images that appear to move; created through drawings, computer graphics, or photographs
FILM FOOTAGE	visual images captured on film or digitally; edited to deliver information clearly
GRAPHICS	drawings (maps, charts, diagrams, and so on) used to represent ideas or data

Sound elements include what you hear in a video.

MUSIC	instrumental and/or singing; emphasizes the emotional mood; may signal shifts in topic
NARRATION	words spoken over the images; carefully worded to present key facts

Discover all the risks and view every nail-biting step of this high-stakes space mission.

Ed
Video
View **"Seven Minutes of Terror"** in your ebook.

© Houghton Mifflin Harcourt Publishing Company • Image Credits: 7 Minutes of Terror: NASA Jet Propulsion Laboratory

ESSENTIAL QUESTION:
Is space exploration a daring adventure or a dangerous risk?

Analyze Media

Support your responses with evidence from the video.

1. **INTERPRET** Explain the title "Seven Minutes of Terror." How does the pacing, or the time each shot lasts on screen, suggest a sense of danger or even terror?

2. **INFER** Why do you think the creators of the video use close-up shots of *Curiosity* team members who comment on the unfolding events?

3. **CAUSE/EFFECT** Review the animation and the experts' narration about the parachute used in this mission. What problems did the NASA engineers identify that the parachute could solve?

4. **EVALUATE** How effective is the video in explaining NASA's plan to prevent a dust cloud when *Curiosity* landed? Explain which visual and sound elements support your evaluation, and why.

5. **REVIEW** Review the video to find memorable quotations or details that mark important stages of the EDL (entry, descent, and landing) sequence for *Curiosity.* Add your findings to the graphic organizer below. What do these details tell you about the complexity of landing safely on Mars?

From the top of the atmosphere down to the surface, it takes us seven minutes. →	→	
	→	

6. **CRITIQUE** Think about the purpose of the video. Consider the techniques that are used to support the information presented. Do you think "Seven Minutes of Terror" is an effective informational video? Why or why not?

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Choices

Here are some other ways to demonstrate your understanding of the ideas in this lesson.

Writing

Close Encounters

Write a personal narrative from the viewpoint of someone who encounters a being from another planet.

- Choose a setting (Earth? Another planet? Space?) and outline the beginning, middle, and end of the narrative.
- Decide whether your narrative will have a "lesson," and if so, how you will show it through events in the plot.
- Tell the events in order, using a first-person point of view.
- Choose words and details that appeal to the senses.

Media

Make Your Own Video

Curiosity touched down successfully on the Gale Crater in 2012. With a team, briefly research any discoveries the rover has reported to NASA since its landing. Use the information to create your own short video update.

- Working as a team of reporters, categorize your findings and assign each discovery to a team member.
- Sketch out the sound and visual elements you might use.
- Your video can include your own graphics and drawings as well as downloadable materials from NASA.

Speaking & Listening

Group Discussion

With a small group, talk about the visual and sound elements in "Seven Minutes of Terror." Which elements most effectively communicate the "terror" suggested by the video's title? Discuss how each element delivers a particular emotional effect.

- Make notes about visual and sound elements in the video that particularly impressed you.
- Using examples from the video, explain how each element you noted delivers an emotional effect.
- Take notes on your group's discussion. Use your notes to present a summary of the discussion for a larger group.

As you write and discuss, be sure to use the Academic Vocabulary words.

- complex
- potential
- rely
- stress
- valid

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Collaborate & Compare

ESSENTIAL QUESTION:
Is space exploration a daring adventure or a dangerous risk?

Compare Arguments

You are about to read two arguments about the risks and rewards of space travel. As you read, notice the persuasive techniques and main points contained in each argument. Then, think about each argument's central claim.

MENTOR TEXT

A

Humans Need to Explore Outer Space

Argument by **Claudia Alarcón**
pages 276–280

MENTOR TEXT

B

Let Robots Take to the Stars

Argument by **Eiren Caffall**
pages 286–290

After you read both arguments, you will collaborate with a small group to write a job description for an astronaut.
You will:

- Choose a Side
- Gather Information
- Write a Job Description
- Share What You Learn

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MENTOR TEXTS

Humans Need to Explore Outer Space

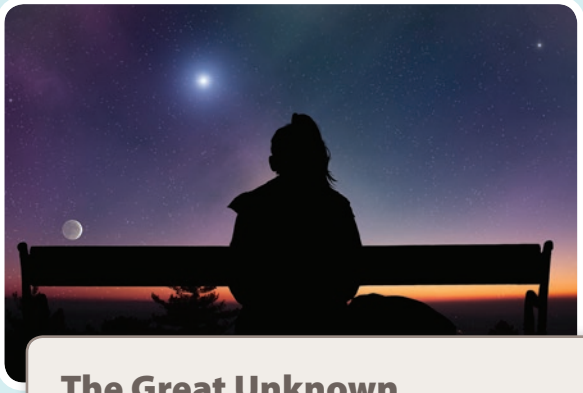
Argument by **Claudia Alarcón**

Let Robots Take to the Stars

Argument by **Eiren Caffall**

Engage Your Brain

Choose one or both activities to start connecting with the selections you are about to read.



The Great Unknown

Space exploration promises to answer many questions about our world and our universe. What questions do you have about what is out there, in space? Write a list of questions and then share them with the rest of the class.

Dig In

What do you know about space exploration today? Do some research and look for the answers to the following questions:

- How many people have gone into space?
- What is the International Space Station?
- When is the next rover going to Mars?

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Analyze Argument

In an argument, an author states a claim and supports it with reasons and evidence. A **claim** is the author's position on a problem or issue. The strength of an argument relies not on the claim itself but on the support. **Support** consists of reasons and evidence used to prove the claim. Reasons are declarations made to explain an action or belief. **Evidence** includes specific facts, statistics, or examples. To trace, or follow the reasoning of, an argument:

- Identify the claim, which may be stated directly or implied.
- Look for reasons and evidence that support the claim.
- Note how the author connects the claim, reasons, and evidence.
- Identify **counterclaims,** statements that address opposing viewpoints. A good argument anticipates opposing viewpoints and provides counterclaims to disprove the opposing views.

Focus on Genre

Argument

- includes a claim and counterclaims
- includes reasons and evidence to support the claim
- may contain rhetorical devices
- may be formal or informal

Analyze Rhetorical Devices

Rhetorical devices are techniques that writers use to enhance their arguments and communicate more effectively. A few rhetorical devices are described below, along with examples of each from the selections. Look for these devices as you read.

RHETORICAL DEVICE	EXAMPLE
Addressing readers using the pronoun *you* or *yourself* is a device called direct address. **Direct address** gets readers' attention and connects them to the topic.	Imagine yourself as an astronaut, a part of the first manned mission to Mars.
Rhetorical questions are questions someone asks without expecting an answer. Writers use them to engage the reader or to suggest that their arguments make the answer obvious.	Would you want to trust a scientific mission to the people who run reality TV?
Loaded language consists of words with strongly positive or negative connotations intended to influence a reader or listener.	This form of mining, therefore, would be incredibly beneficial for our survival and advancement.

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Annotation in Action

In the model, you can see one reader's note on "Let Robots Take to the Stars." As you read, note the author's use of rhetorical devices.

The risks of space exploration could be grave for a planet already plagued by pollution. There is an extra result of space travel: black carbon from rocket exhaust that's deposited in the outer atmosphere.

The negative connotations of these words suggest that the author is against space exploration.

Expand Your Vocabulary

Put a check mark next to the vocabulary words that you feel comfortable using when speaking or writing.

administration	☐
prominent	☐
beneficial	☐
plague	☐
dubious	☐
erupt	☐

Turn to a partner and talk about the vocabulary words you already know. Then, use the words to write a few sentences about what you know about space travel.

As you read the selections, use the definitions in the side column to learn the vocabulary words you don't already know.

Background

Exploring the outer reaches of our solar system and sending humans to Mars is no longer the stuff of science fiction. For decades, NASA has sent orbiters and rovers to the Red Planet. Now the goal is to send humans to Mars by the 2030s. Many scientists and politicians support this goal. However, not everyone is on board. Many wonder whether humans would be as effective as robots in confronting the enormous challenges of deep-space exploration. Writers **Claudia Alarcón** (top) and **Eiren Caffall** (bottom) weigh in on opposite sides of the issue.

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Humans Need to Explore Outer Space

Argument by **Claudia Alarcón**

The author argues that space exploration requires a human touch.

NOTICE & NOTE
As you read, use the side margins to make notes about the text.

ANALYZE ARGUMENT

Annotate: Mark the author's central claim in paragraph 1.

Interpret: What does the author think we should do?

1 What is out there? Are we alone in the universe? Are there inhabitable planets in our galaxy and beyond? For decades, science-fiction novels, movies, and TV shows fired our curiosity. After the real-life *Apollo 11*'s moon mission in 1969, enthusiasm for new discoveries soared. Now, well into the twenty-first century, we must face the fact that these same questions are still unanswered. With so much human investment made, we must go forward, fully embracing space exploration as an important priority. Our future in space depends on science.

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Don't forget to **Notice & Note** as you read the text.

2 Space exploration in the 1960s was fueled by the Cold War space race between the United States and Russia. The twenty-first century has brought a universal spirit of collaboration among scientists from around the globe. An excellent example is the International Space Station. This orbiting laboratory and construction site combines the scientific expertise of 16 nations. It allows for a permanent human outpost in space. The hope is that the station can serve as a launching platform for further space exploration.

3 But space travel is not without risk. NASA's Space Shuttle Program, which was the main connection to the International Space Station, suffered two terrible losses. After the explosions of the *Challenger* in 1986 and *Columbia* in 2003, the program was shut down in 2011. Recent presidential **administrations** supported putting priority on the commercial space flight industry. A program was put into place to help private companies pursue work on human space flight. There are dozens of private companies in the industry known informally as "New Space." These companies have set their sights on what seem to be impossible goals. These range from tourist trips to the moon to the colonization of Mars. Space travel has its documented dangers; however, direct human involvement, aided by technological innovation, could likely boost the potential for discovery.

4 Technological innovations are allowing us to venture even farther into space. Such advances are opening windows into worlds we previously could not have imagined. Robotic spacecraft have conducted some of NASA's most exciting and productive missions. A **prominent** example is the Hubble Space Telescope, which has made more than 1.3 million observations since its mission began in 1990. It has traveled more than 4 billion miles, sending back stunning photos of faraway stars and galaxies.

5 NASA has also conducted robotic missions within our solar system. The *Cassini's* mission to Saturn was one of the most ambitious efforts in planetary space exploration. This robotic spacecraft carried the *Huygens* probe, which parachuted to the surface of Titan, Saturn's largest moon. The *Juno* spacecraft orbited around Jupiter, sending observations that can help scientists understand the beginnings of the solar system. The *New Horizons* spacecraft flew by Pluto in 2015 after an almost ten-year flight. According to the National Academy of Sciences, the exploration of Pluto and the Kuiper belt is the highest priority for solar system exploration. The asteroids in the Kuiper belt offer a great opportunity for mining. Space mining

administration
(ăd-mĭn´ĭ-strā´shən) *n.* A president's *administration* is his or her term of office.

ANALYZE RHETORICAL DEVICES

Annotate: Mark examples of loaded language in paragraph 4.

Analyze: Why do you think the author chose these words? How do they enhance her argument?

prominent
(prŏm´ə-nənt) *adj.* If something is *prominent*, it stands out.

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presents an important step for finding resources necessary for interstellar travel and exploration. In addition, icy asteroids may provide a cost-effective solution to space travel. Space entrepreneurs are looking into using hydrogen and oxygen from asteroid ice to manufacture rocket fuel. This space-made fuel can be used to launch expeditions farther out into space at considerably less cost.

6 Our moon contains helium-3, an element that could be useful on Earth for energy developments such as nuclear fusion research. Mining there can also yield rare-earth metals (REMs) that are used in electronics and in the construction of solar panels. This form of mining, therefore, would be incredibly **beneficial** for our survival and advancement. In recent years, geological surveys have indicated the presence of water on the moon, which can to sustain a human-inhabited lunar base.

7 Scientists are also looking toward Mars as a potential new home for humankind. New discoveries keep emerging that raise more questions. It is imperative that we use all our available resources to continue research on Mars.

8 Early missions to Mars such as *Mars Odyssey* were designed to make discoveries under the theme of "Follow the Water." These missions showed the possibility of liquid water below the surface of Mars. With the *Curiosity* rover, the Mars Exploration Program is following a next-step strategy known as "Seek Signs of Life." This exploration phase aims to discover the possibilities for past or present life on the Red Planet. *Curiosity* is seeking evidence of organic materials, the chemical building blocks of life. Future Mars missions would likely be designed to search for life itself in places identified as potential past or present habitats.

9 With all these advances and technologies in place and in development, will we see a human colony on the moon or on Mars in our lifetime? The best-case scenario will involve a partnership between NASA and international space travel companies.

10 Some New Space pioneers have tested supersonic retropropulsion technology, landing rocket boosters on floating platforms and on land. This technique could be important for future Mars landings. NASA's rovers, weighing up to a ton, have successfully landed on Mars. However, they have dropped to the planet's surface in air bags, using rockets, and with the assistance of cables extended from a "sky crane."

beneficial
(bĕn´ə-fĭsh´-əl) *adj.* When something is *beneficial,* it is good or favorable.

Ed

Text in Focus Video

Learn more about identifying main ideas.

ANALYZE ARGUMENT

Annotate: In paragraph 7, mark a reason that the author uses to support her claim that we must continue to explore space.

Evaluate: Is the reason relevant? Does it make sense? Explain.

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This section of the immense Carina Nebula was captured by the Hubble Telescope.

Don't forget to **Notice & Note** as you read the text.

A human mission would weigh much more, making landing more problematic. The previous solutions would not work for spacecraft carrying humans.

11 On the other hand, the future of the human race and Earth itself is at stake. We are close to surpassing our planet's carrying capacity and exhausting our natural resources. Yet scientists and space entrepreneurs remain hopeful. Private companies seeking to colonize Mars believe the risk of space flight is similar to that of climbing Mount Everest. As we all know, this is a risky, but not impossible, proposition.

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This is a view of the Hubble Telescope.

12 The final frontier is a vast and dangerous place, difficult and expensive to explore. But it offers infinite possibilities for expanding our scientific knowledge of our planet and its origins. Exploring outer space can yield new sources for precious natural resources and perhaps even a home for future generations. We live in times in which space travel and exploration should be more science than fiction. Let's keep pursuing the compelling questions that have driven us to these times. Space exploration may very well hold the key to humanity's future.

ESSENTIAL QUESTION:

Is space exploration a daring adventure or a dangerous risk?

Review your notes and add your thoughts to your Response Log.

TURN AND TALK

What reasons in this argument seem especially strong to you? Share your reactions with a partner.

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Assessment Practice

Answer these questions before moving on to the **Analyze the Text** section on the following page.

1. This question has two parts. First answer **Part A**, then **Part B**.

Part A

How does the author support the claim that greater discoveries in outer space are happening thanks to technological innovations?

- (A) The author includes quotations from experts on space exploration.
- (B) The author proposes ideas that may help humans on Earth.
- (C) The author poses questions that are still unanswered.
- (D) The author cites advances made as a result of recent space missions.

Part B

Select **two** sentences that provide relevant support for the answer in Part A.

- (A) "Are there inhabitable planets in our galaxy and beyond?" (paragraph 1)
- (B) "After the explosions of the *Challenger* in 1986 and *Columbia* in 2003, the program was shut down in 2011." (paragraph 3)
- (C) "A prominent example is the Hubble Space Telescope, which has made more than 1.3 million observations since its mission began in 1990." (paragraph 4)
- (D) "The *Juno* spacecraft orbited around Jupiter, sending observations that can help scientists understand the beginnings of the solar system." (paragraph 5)
- (E) "It is imperative that we use all our available resources to continue research on Mars." (paragraph 7)

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Test-Taking Strategies

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Analyze the Text

Support your responses with evidence from the text.

NOTICE & NOTE

Review what you **noticed and noted** as you read the text. Your annotations can help you answer these questions.

1. **INFER** Why might the government have shifted from supporting space travel through NASA to prioritizing commercial travel?

2. **ANALYZE** How could space mining aid in scientific research? Use the chart to cite evidence from the text that explains the importance of space mining.

EVIDENCE	IMPORTANCE

3. **DRAW CONCLUSIONS** Review paragraph 8. What can you conclude from the support provided by the author about the connection between water and the possibility of life on Mars?

4. **EXPLAIN** How does the New Space pioneers' testing of supersonic retropropulsion technology support the author's claim? How does it add to your understanding of the argument?

5. **EVALUATE** Explain how the argument's loaded language affects readers. Does it persuade you to agree with the author? Why or why not?

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Choices

Here are some other ways to demonstrate your understanding of the ideas in this lesson.

As you write and discuss, be sure to use the **Academic Vocabulary** words.

- **complex**
- **stress**
- **potential**
- **valid**
- **rely**

Writing

Write a Letter

Write to your representative in Congress to find out his or her views on space exploration.

- Identify your representative by going online to the U.S. House of Representatives website.
- Include a heading and a formal greeting. Then, begin the body of the letter by introducing the topic. Clearly state your reasons for writing.
- Close your letter by thanking your representative. Provide contact information so that he or she can send the information you are seeking.

Research

Explore the International Space Station

With a small group, investigate the operations of the International Space Station (ISS).

- The ISS is exactly that—international. Find out which countries collaborate to support the ISS and how they work together.
- Learn about three crew members, past or present. How long were they on the ISS? What did they study?
- Look into any reported physical effects of serving on the ISS.
- Combine your findings into a presentation.

Speaking & Listening

Discuss Loaded Language

Remember that loaded language is wording the author uses to grab attention and persuade. Review "Humans Need to Explore Outer Space" and list examples of loaded words or phrases.

- With a partner, categorize the loaded language you find according to whether it has a positive or negative connotation.
- Discuss what each example contributes to the author's argument on space exploration.

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Expand Your Vocabulary

PRACTICE AND APPLY

Answer each question using the boldfaced vocabulary word in a complete sentence.

1. Which presidential **administration** is in the White House?
2. Who is a **prominent** person in your school?
3. What is one thing that would be **beneficial** for your grades?

Ed
Interactive Vocabulary Lesson: Denotation and Connotation

Vocabulary Strategy

Connotations and Denotations

A word's denotation is its literal dictionary definition. A word's connotation comes from the ideas and feelings associated with the word.

> Technological innovations are allowing us to venture even farther into space.

Notice how the specific word choice of ***venture***, rather than ***go,*** suggests daring. Context can help you determine the connotation of a word.

PRACTICE AND APPLY

For each item, mark the word that best fits the sentence. Use a print or online dictionary to help you. Then, write the reason for your choice.

1. NASA scientists want to find out more about Mars. The scientists are (inquisitive, prying).

_____

2. Astronauts on the International Space Station must work with each other. The work requires them to (conspire, cooperate).

_____

3. Radiation is a serious risk for astronauts working in space. It can be (hazardous, menacing) to their health.

_____

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Watch Your Language!

Subordinating Conjunctions in Complex Sentences

A sentence that contains at least one subordinate clause and an independent clause is called a **complex sentence.** Consider these examples of complex sentences from "Humans Need to Explore Outer Space."

> As we all know, this is a risky, but not impossible, proposition.
>
> NASA's Space Shuttle Program, which was the main connection to the International Space Station, suffered two terrible losses.

In the first example, the subordinate clause begins with a subordinating conjunction (***as***). The conjunction reveals a relationship between the two clauses. In the second example, the subordinate clause begins with a relative pronoun (***which***). Relative pronouns introduce a relative clause, a type of subordinate clause. This chart shows some common subordinating conjunctions and relative pronouns.

SUBORDINATING CONJUNCTIONS	RELATIVE PRONOUNS
after, although, as, as soon as, because, before, when, whenever, while	that, which, who, whom, whoever, whomever, whose

PRACTICE AND APPLY

Write your own complex sentences using a subordinating conjunction or a relative pronoun in each.

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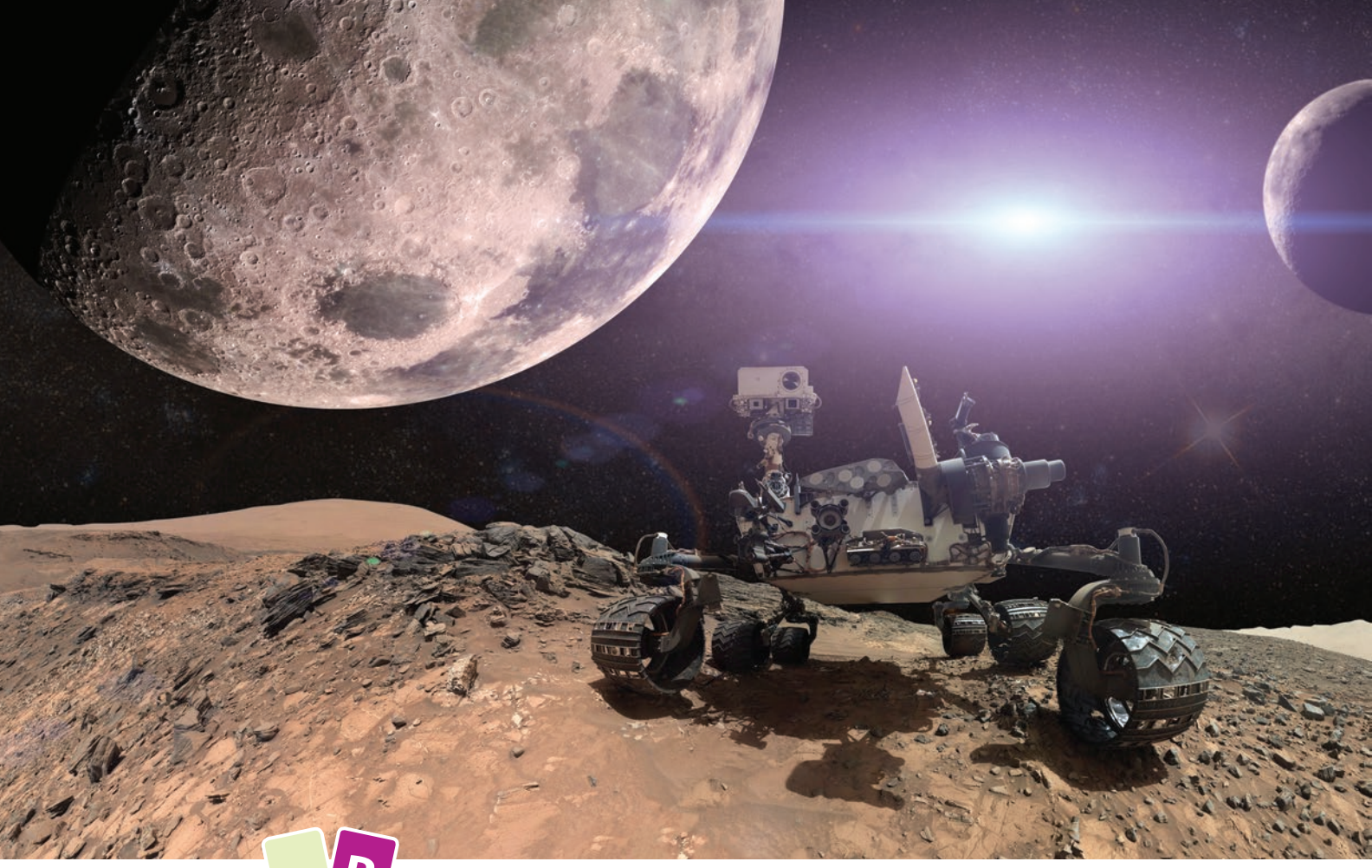

B

Let Robots Take to the Stars

Argument by **Eiren Caffall**

Should robots lead the journey to outer space? This writer says yes.

NOTICE & NOTE
As you read, use the side margins to make notes about the text.

ANALYZE ARGUMENT

Annotate: In paragraph 1, mark the author's central claim and mark the reasons the author will use to support the claim.

Interpret: What will the author's argument be? How does the title of the selection help clarify the author's argument?

1 The lure of human space travel is undeniable. We've all grown up on endless types of entertainment set in the future that portray adventures on distant planets. Imagine yourself as an astronaut, a part of the first manned mission to Mars. Beyond that, there are generations of people who have been working to make space and space travel look cool, even inevitable. But high aspirations and romance aside, we need to face the harsh realities. Our notions about the inevitability and wonder of human space travel need to be checked, and any plans need to be reconsidered. Some of the best reasons to curtail space exploration come down to economics, human cost, and technology.

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Space Travel Is Expensive

2 Space travel is extremely expensive. To get humans to Mars, it would take $1 trillion over a 25-year period. Obviously, no single government would want to take on that kind of funding. A Mars mission would require international cooperation at a significant cost to each partner nation. A Mars mission might foster international cooperation, but it would consume funds that could be used for other things.

3 Some people suggest that the only way to get to Mars would be with the help of private companies. Because of this, the space exploration industry is made up not only of government agencies but also private companies headed by dreamers and people interested in profits over practicality. But these organizations are often badly managed. They don't work for the government, so accountability could be a problem. Even well-run companies are unlikely to have enough money to launch a Mars mission on their own. There are some experts who say that it wouldn't be possible to launch a mission to Mars without funding from commercials that would run during coverage of the project. That would turn a scientific mission into a reality television show. Would you want to trust a scientific mission to the people who run reality TV?

Space Travel Could Harm Our Polluted World

4 The risks of space exploration could be grave for a planet already **plagued** by pollution. There is an extra result of space travel: black carbon from rocket exhaust that's deposited in the outer atmosphere. The launch of a suborbital tourist craft is said to produce less carbon emissions than a standard flight from New York to London. However, once the rocket is above the atmosphere, the black carbon it releases can be pretty damaging. Try to imagine the black smoke from a diesel truck sitting above the sky. With no weather to wash it into the oceans, black carbon can stay put for up to ten years.

5 Many space boosters are suggesting that being able to leave our planet once it's exhausted of resources is a priority. They seem to be proposing that we have some sort of Planet B. Somehow they think that a colony on Mars or the moon could take the pressure off our world. Many of these people planning to profit from two things at once are also fans of the **dubious** technology of geoengineering.

Don't forget to **Notice & Note** as you read the text.

ANALYZE ARGUMENT

Annotate: In paragraph 5, mark an opposing viewpoint.

Analyze: What are the author's counterclaims to this viewpoint, as explained in paragraphs 5 and 6?

plague
(plāg) *v.* To *plague* is to cause hardship or suffering.

dubious
(dōō´bē-əs) *adj.* If something is *dubious*, it is questionable or not to be relied upon.

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NOTICE & NOTE
NUMBERS AND STATS

When you notice the use of specific quantities or comparisons to depict amount, size, or scale, you've found a **Numbers and Stats** signpost.

Annotate: In paragraph 7, mark specific numbers that identify amounts.

Analyze: What purpose do these specific numbers serve?

6 As covered earlier, the essential ingredients for space exploration are international cooperation, vast investments of money, technological advances, global regulations, and the buy-in of the general population. Yet those ingredients may well be what's needed to tackle the problem of Earth's pollution.

Space Travel Is More Suited to Robots

7 NASA recently collected data from the Mars *Curiosity* rover. The data were used to estimate the radiation impact on an astronaut traveling to and from Mars for 365 days and spending 500 days on the surface. It was determined that during that trip an astronaut would get a radiation dose that was about five percent of what he or she would get over a lifetime on Earth.

8 That significantly increases the risk of cancer. There is also the danger of running low on supplies. Once on the Red Planet, humans would eventually run out of food and materials. A Massachusetts Institute of Technology study guessed that agriculture would make too much oxygen for the small colony

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to support inside its dome. Without enough carbon dioxide, the colony would not be able to grow what it needed. Earth would constantly be sending supplies to the colonists. It's obvious that without that resupply, there would be no hope of agriculture supporting a manned station on Mars.

9 Considering the extreme risks for humans, some scientists assert space exploration should be strictly robotic. Think about the achievements of the Hubble Space Telescope and the Mars *Pathfinder* and *Opportunity*. Their exploratory missions have captured the public imagination, and all of us love to see images from those robot explorers. When *Opportunity* landed safely on the surface of Mars, NASA's Mission Control Center **erupted** in as loud a cheer as greeted any human mission.

10 There are scientists who say that robots can't accomplish space travel as cheaply or efficiently as humans. But, as is often the case, those ideas are based on data from the distant history of space travel. As you might guess, the future of space exploration presents a very different picture, one in which robots will replace humans as the better pilots and researchers.

Don't forget to **Notice & Note** as you read the text.

erupt
(ĭ-rŭpt´) *v.* When something *erupts*, it develops suddenly.

ANALYZE RHETORICAL DEVICES

Annotate: Mark an example of direct address in paragraph 10.

Infer: Why does the author use direct address here?

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Space Travel Isn't Inevitable or Even Necessary

11 There are many solid arguments against spending money, time, and energy on manned space exploration. There is no solid reason to think of space as the only hope of our bright technological future. There are as many ways to innovate as there are human ideas. Just because the idea of space travel has been with us for decades doesn't mean that it's the best way to direct our dreams. Let's plot a course that doesn't involve humans. Without space travel as the default idea for our future, what new ideas might lead to amazing discoveries and inventions?

ESSENTIAL QUESTION:
Is space exploration a daring adventure or a dangerous risk?

Review your notes and add your thoughts to your Response Log.

TURN AND TALK

Single out any point the writer makes that triggers a response in you. Discuss this point with a partner.

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Assessment Practice

Answer these questions before moving on to the **Analyze the Text** section on the following page.

1. Which **two** sentences from the text support the claim that space travel should be curtailed because of pollution?

- (A) "The launch of a suborbital tourist craft is said to produce less carbon emissions than a standard flight from New York to London." (paragraph 4)
- (B) "However, once the rocket is above the atmosphere, the black carbon it releases can be pretty damaging." (paragraph 4)
- (C) "Try to imagine the black smoke from a diesel truck sitting above the sky." (paragraph 4)
- (D) "With no weather to wash it into the oceans, black carbon can stay put for up to ten years." (paragraph 4)
- (E) "Many space boosters are suggesting that being able to leave our planet once it's exhausted of resources is a priority." (paragraph 5)

2. What perspective is shared by the author of this text and the author of "Humans Need to Explore Outer Space"?

- (A) Pollution is a concern related to space exploration.
- (B) Cost should not be a consideration for space travel.
- (C) Robots should be used to explore outer space.
- (D) Space exploration is essential for human survival.

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Test-Taking Strategies

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Analyze the Text

Support your responses with evidence from the text.

NOTICE & NOTE

Review what you **noticed and noted** as you read the text. Your annotations can help you answer these questions.

1. **INTERPRET AND ANALYZE** Review paragraph 3. What is the author's position on using private companies for Mars missions? What rhetorical devices does the author use to support her position, and why?

2. **EVALUATE** Review paragraphs 4–6. Does the author present an effective argument about why space travel could end up harming Earth? Explain.

3. **CRITIQUE** In paragraph 10, the author predicts robots will replace humans for space travel. Indicate on the chart whether you agree or disagree with the author. Explain your answer with reasons and supporting evidence.

AGREE	DISAGREE	REASONS AND EVIDENCE

4. **SUMMARIZE AND ANALYZE** Examine the section headings in "Let Robots Take to the Stars" and then summarize the reasons that support the author's claim. Why do you think she put the reasons in the order she did? Which reason is last? Why did she save it for last?

5. **EVALUATE** How does the author use **Numbers and Stats** to support her claim? Would her argument be as effective without specific numbers—for example, dollar amounts? Explain.

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Choices

Here are some other ways to demonstrate your understanding of the ideas in this lesson.

As you write and discuss, be sure to use the **Academic Vocabulary** words.

- **complex**
- **stress**
- **potential**
- **valid**
- **rely**

Writing

Short Story

Write about an astronaut who is about to embark on a space mission but suddenly changes his or her mind.

- Introduce your characters and setting, and establish a point of view through your narrator.
- Then, establish and develop the conflict and sequence of events. Remember to use dialogue, pacing, and descriptive details.
- To conclude your story, resolve the conflict and leave readers with a message to consider.

Social & Emotional Learning

Explore Health Demands

Space can be a stressful and dangerous environment. With a small group, investigate what studies have shown about the challenges astronauts face, especially in an upcoming era of long-term space travel.

- What do scientists know about the psychological demands of space travel?
- What role has the International Space Station played in revealing challenges of living in space?
- What are NASA or other agencies developing to enhance space travelers' emotional well-being?

Speaking & Listening

Demonstration

Become familiar with the resources on NASA's website. Then, with a partner, demonstrate how to use the resources.

- With your partner, go to NASA.gov and explore the website. Notice the specific mission and project links on the home page, as well as recent NASA news.
- Note the pathways you must take to access various kinds of information (for example, to find recent crew members on the International Space Station or to view images).
- With your partner, demonstrate how to navigate the NASA site to access the site's resources. Walk your audience through the steps, noting the range of information and how to find specific items.

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Expand Your Vocabulary

PRACTICE AND APPLY

Mark the letter of the better answer to each question. Be prepared to explain your responses.

1. Which of these articles is more likely to be **dubious**?
   - **a.** a report on a heat wave in California
   - **b.** a report on an alien spaceship in Central Park
2. Which pair of factors is more likely to **plague** a city?
   - **a.** traffic jams and litter
   - **b.** warm weather and sunshine
3. Which situation is more likely to make an audience **erupt** in applause?
   - **a.** a guitarist playing a solo
   - **b.** a lecture on hygiene

Vocabulary Strategy

Use a Dictionary

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Interactive Vocabulary Lesson: Using Reference Sources

Print or digital dictionaries and glossaries are great resources for checking the correct **spelling** and **definition** of a word. They can also give you information about the **syllabication, pronunciation, part of speech, alternate meanings,** and **word history** of entries. Here is an example of a dictionary entry for the word *erupt*.

- **Spelling and syllabication**
- **Pronunciation**
- **Part of speech**

e·rupt (ĭ-rŭpt´) *intr. v.* **e·rupt·ed, e·rupt·ing, e·rupts**

Definitions

1. **a.** To throw or force something out violently, such as lava, ash, and gases: *The volcano erupted.*
   b. To be thrown or forced out: *Water erupted from the geyser.*
2. To develop suddenly: *Violence erupted during the protests.*
3. To express oneself suddenly and loudly: *He erupted in anger.*
4. **a.** To break through the gums in developing. Used of teeth.
   b. To appear on the skin. Used of a rash or blemish.

Word history

[Latin *ērumpere, ērupt-* : *ē-, ex-, ex-* + *rumpere*, to break]

PRACTICE AND APPLY

Use a print or digital dictionary to look up the words *plague* and *dubious*. On a separate sheet of paper, write the syllabication, pronunciation, word history, and definition of each word as it is used in the selection. Then write a complete sentence using each word.

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Watch Your Language!

Subject-Verb Agreement

A **complex sentence** contains an independent, or main, clause and at least one subordinate clause. A **clause** is a group of related words that includes both a subject and a verb. In a complex sentence, the subject and verb in both clauses must agree in number. **Subject-verb agreement** means that if the subject is singular, the verb must also be singular; if the subject is plural, the verb must also be plural. Study this example from "Let Robots Take to the Stars."

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Interactive Vocabulary Lesson: Subject-Verb Agreement

> As you might guess, the future of space exploration presents a very different picture, one in which robots will replace humans as the better pilots and researchers.

Note that there are two clauses in the sentence. In the first one, the subject *you* agrees with the verb *might guess.* In the second one, the subject *robots* agrees with the verb *will replace.* The subject and verb of the independent clause (*future* and *presents*) also agree.

PRACTICE AND APPLY

Draft a short paragraph about space travel or about the arguments you just read. Then, check that every sentence is complete and uses correct subject-verb agreement.

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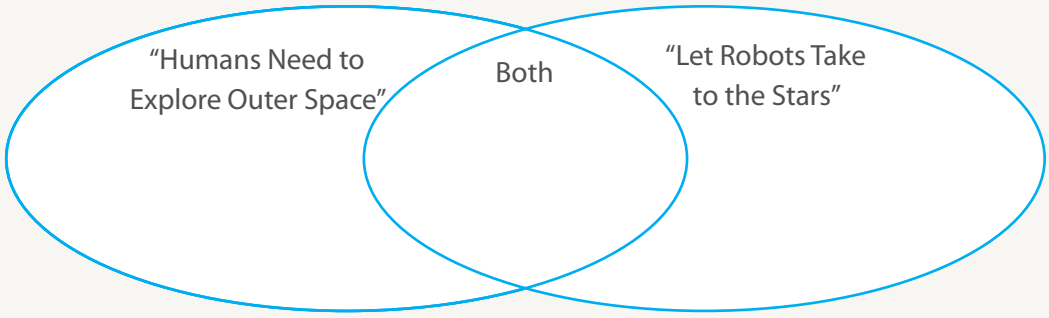
Compare Arguments

When you compare two or more texts on the same topic, you synthesize the information, making connections and expanding on key ideas.

In a small group, complete the Venn diagram with similarities and differences in the two arguments you read. Consider the subjects being compared, claims made, reasons and evidence given, and rhetorical devices and persuasive techniques used by each author.



Analyze the Texts

Discuss these questions in your group.

1. **COMPARE** With your group, study your Venn diagram. How do the claims in the two arguments differ? What is similar about the ways the authors present their reasons and supporting evidence?

2. **ANALYZE** What similarities do you see between the authors' ideas about space exploration? Explain.

3. **EVALUATE** What rhetorical devices and persuasive techniques does each author use? How effective is each author's use of these devices and techniques? Why?

4. **CRITIQUE** Which argument is more convincing? Why?

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Collaborate and Research

Your group can continue exploring the ideas in these texts by working together to research and write a job description for an astronaut. Then research some real-life astronauts and determine how well they match your job description. Follow these steps:

1. **CHOOSE A SIDE** In your group, decide who will research the requirements for becoming an astronaut and who will research real-life astronauts.

2. **GATHER INFORMATION** As you research your specific focus, check that your sources are **reliable** (reputable and up to date) and **credible** (presenting ideas fairly and accurately). Take notes from at least one source, paraphrasing and summarizing key information. You can use this framework to record your findings.

FOCUS:	
SOURCE(S):	
INFORMATION:	

3. **WRITE A JOB DESCRIPTION OR PROFILE** Use your research notes to write either a job description for an astronaut or a profile of an astronaut you researched. Your profile should include information about the astronaut's education, work experiences, and training.

4. **SHARE WHAT YOU LEARN** Each person in your group now has a general idea of what it takes to become an astronaut. Listen as each group member presents a job description or profile. Then, discuss how well each real-life astronaut meets the job description. As a group, discuss what most surprised you about the astronauts' backgrounds and about specific job requirements. Talk about whether the research made you more or less interested in becoming an astronaut.

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Reader's Choice

Continue your exploration of the Essential Question by doing some independent reading on space exploration. Read the titles and descriptions shown. Then mark the texts that interest you.

ESSENTIAL QUESTION:
Is space exploration a daring adventure or a dangerous risk?

Short Reads

Available on Ed

These texts are available in your ebook. Choose one to read and rate. Then defend your rating to the class.

Let's Aim for Mars

Argument by **Buzz Aldrin**

A former astronaut proposes "opening space to the average person" by colonizing Mars.

Rate It ☆ ☆ ☆ ☆ ☆

An Optimistic View of the World

Personal Essay by **Dan Tani**

Based on his space experiences, Dan Tani provides an optimistic perspective on life.

Rate It ☆ ☆ ☆ ☆ ☆

Your World

Poem by **Georgia Douglas Johnson**

Discover inspiration in these well-crafted words about the importance of taking risks.

Rate It ☆ ☆ ☆ ☆ ☆

Sally Ride
from Headstrong

Biography by **Rachel Swaby**

America's first female astronaut launched into space and changed our exploration approach.

Rate It ☆ ☆ ☆ ☆ ☆

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Long Reads

Here are three recommended books that connect to this unit topic. For additional options, ask your teacher, school librarian, or peers. Which titles spark your interest?

A Wrinkle in Time

Novel by **Madeleine L'Engle**

When Meg Murray learns that instant space travel is real, she has the chance to save her father, see her brother's brilliance, and understand her own strengths.

Path to the Stars

Memoir by **Sylvia Acevedo**

Being introduced to the Girl Scouts changes Sylvia Acevedo's life. She carves her own path to the stars by embarking on a journey from scout to rocket scientist.

Ender's Game

Novel by **Orson Scott Card**

Andrew Wiggin, nicknamed "Ender," is tapped for a training program in space with the goal of defeating Earth's alien enemies. Is Ender humanity's only hope?

Extension

Collaborate & Create

IMAGINE THAT Write some journal entries from the point of view of a character or subject from one of the texts. In one of the entries, reveal how that individual would respond to the Essential Question.

POPCORN CRITIC If you chose a book with a movie version, create a podcast in which you and a partner compare the book to its film version. Answer questions such as the following:

- Is the film a good reproduction of the novel? In what ways?
- How does the film clarify any questions you had about the book?
- Which version do you prefer? Why?

NOTICE & NOTE

- Pick one of the texts and annotate the **Notice & Note** signposts you find.
- Then, use the **Notice & Note Writing Frames** to help you write about the significance of the signposts.
- Compare your findings with those of other students who read the same text.

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Notice & Note
Writing Frames

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Write an Argument

Writing Prompt

Using ideas, information, and examples from multiple texts in this unit, write an argumentative essay for your school newspaper in which you support or oppose sending humans into space.

Manage your time carefully so that you can

- review the texts in the unit;
- plan your essay;
- write your essay; and
- revise and edit your essay.

Be sure to

- clearly state the claim of your argument;
- address alternate or opposing claims;
- use and cite evidence from multiple sources; and
- avoid relying too much on one source.

Review the Mentor Texts

For two examples of well-written arguments you can use as mentor texts and as sources for your essay, review:

- "Humans Need to Explore Outer Space" (pages 276–280)
- "Let Robots Take to the Stars" (pages 286–290)

Review your notes and annotations about these texts. Think about how the authors make their arguments convincing.

Consider Your Sources

Review the list of texts in the unit and choose at least two that you may want to use as support for your argument.

As you review potential sources, consult the notes you made on your **Response Log** and make additional notes about ideas that might be useful as you write. Include titles and page numbers so that you can easily find information later.

UNIT 3 SOURCES

- ☐ Dark They Were, and Golden-Eyed
- ☐ Martian Metropolis
- ☐ Challenges for Space Exploration
- ☐ What If We Were Alone?
- ☐ Seven Minutes of Terror MEDIA
- ☐ Humans Need to Explore Outer Space
- ☐ Let Robots Take to the Stars

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Analyze the Prompt

Review the prompt to make sure you understand the assignment.

Mark the sentence in the prompt that identifies the topic of your argument. Rephrase this sentence in your own words.

Then, look for words that indicate the purpose and audience of your essay. Write a sentence describing each.

Find a Purpose

As you respond, consider the two common purposes of an argument:

- to **convince** others to agree with your position
- to **motivate** others to take action

What is my topic? What is my writing task?

What is my purpose?

Who is my audience?

Review the Rubric

Your argument will be scored using a rubric. As you write, focus on the characteristics as described in the chart. You will learn more about these characteristics as you work through the lesson.

PURPOSE, FOCUS, AND ORGANIZATION	EVIDENCE AND ELABORATION	CONVENTIONS OF STANDARD ENGLISH
The response includes: • A strongly maintained claim • Alternate or opposing claims • Use of transitions to connect ideas • Logical progression of ideas • Appropriate style and tone	The response includes: • Integrated, thorough, and relevant evidence • Precise references to sources • Effective use of a variety of elaborative techniques • Clear and effective expression of ideas • Academic and domain-specific vocabulary • Varied sentence structure	The response may include the following: • Some minor errors in usage but no patterns of errors • Correct punctuation, capitalization, sentence formation, and spelling • Command of basic conventions

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1 PLAN YOUR ARGUMENT

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Help with Planning

Consult **Interactive Writing Lesson: Writing Arguments.**

Develop a Claim

In an argument, the **claim** is the writer's position on an issue. In the chart, identify your position on whether human space travel is necessary. Then, draft your claim, making sure it is direct and specific.

IS HUMAN SPACE TRAVEL NECESSARY?	CLAIM

Identify Support

To build a strong argument, you must have solid support for your claim. Support consists of reasons and evidence.

- **Reasons** explain why you have taken a particular position on an issue.
- **Evidence,** such as facts, statistics, examples, or expert opinions, support your reasons.

Use the chart to outline your support. Be sure to record the title of each source and the page number.

Offer the Evidence

As you review your evidence, make sure it is

- **relevant**, or directly related to the claim and reasons.
- **sufficient**, meaning there is enough of it to be convincing.

REASONS	EVIDENCE	SOURCE

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Address Opposing Claims

Your essay should include a **counterclaim** in which you address at least one opposing claim and explain why your position is more valid. Review your notes to find claims that disagree with your position. Then write your counterclaim.

Opposing Claim

My Counterclaim

Organize Ideas

Now organize your material in a way that will help you draft your argument. Keep in mind that a well-written argument demonstrates **coherence**, meaning there is a logical progression of ideas. Paragraph breaks and transitional words and phrases help add coherence to your writing.

Use the table below to help you organize your ideas and add coherence to your writing.

Put It in Order

As you plan, try arranging reasons by order of importance.

- Begin with the most important reason and follow with the second most important reason, and so on.
- Begin with the least important reason and build up to the most important one.

INTRODUCTION	• Clearly introduce your claim. • Include an interesting question, quote, or detail to grab the reader's attention.
BODY PARAGRAPHS	• Present reasons and evidence to support your claim, devoting a paragraph to each main idea. • Include a paragraph in which you address an opposing claim. • Use transitional phrases such as "To begin with . . ." and "Another reason . . ." to link ideas.
CONCLUSION	• Restate your claim and its significance. • Include an insight to give readers something new to think about.

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2 DEVELOP A DRAFT

Now it is time to draft your essay. You can develop your writing skill by seeing how the experts do it. Read about the techniques professional writers use to craft their arguments.

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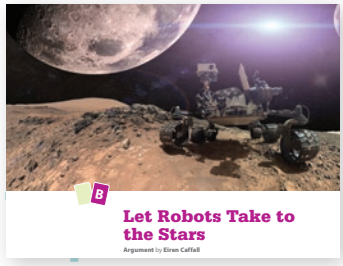
Drafting Online

Check your assignment list for a writing task from your teacher.

Cite Sources Effectively

EXAMINE THE MENTOR TEXT

Notice how the author of **"Let Robots Take to the Stars"** cites a source to support her argument.



The author provides a **reason**.

There is also the danger of running low on supplies. Once on the Red Planet, humans would eventually run out of food and materials. A Massachusetts Institute of Technology study guessed that agriculture would make too much oxygen for the small colony to support inside its dome. Without enough carbon dioxide, the colony would not be able to grow what it needed. Earth would constantly be sending supplies to the colonists.

She refers to her **source** by name and paraphrases from the source.

The author **elaborates** on how the evidence supports her reasoning.

APPLY TO YOUR DRAFT

Use this frame to practice citing a source from your draft. Then, apply this technique to other sources in your argument.

Try These Suggestions

Vary the way you integrate each source into your writing. Try these out:

- In [Title of Text], the author states . . .
- According to paragraph [#], . . .
- The study/statistic proves . . .

Introduce State one reason that supports your claim.	
Cite Name the source that supports the reason. Include the title or the author's name.	
Elaborate Explain how your source and evidence support your reason.	

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Address Opposing Claims

EXAMINE THE MENTOR TEXT

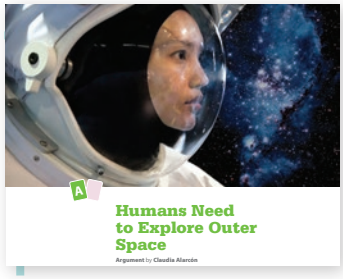
Acknowledging other opinions is one way to strengthen an argument. Here, the author of **"Humans Need to Explore Outer Space"** uses this technique to show that she has carefully considered the risks of space travel.

The author acknowledges an **opposing claim.**

This **transition** signals the contrast between the danger of space travel and its benefits.

> But space travel is not without risk. NASA's Space Shuttle Program, which was the main connection to the International Space Station, suffered two terrible losses. . . . Space travel has its documented dangers; however, direct human involvement, aided by technological innovation, could likely boost the potential for discovery.

She responds with a **counterclaim** that strengthens her argument.



APPLY TO YOUR DRAFT

As you write, make sure to include an opposing claim in your draft. Then, include a counterclaim that addresses the opposing claim. Use the chart to guide you as you counter and crush opposing claims.

INTRODUCE	COUNTER & CRUSH!
Some people suggest …	… however, …
While opponents will say …	… other research shows …
Yes, it's true that …	… but there is growing evidence to support …

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3 REVISE YOUR ARGUMENT

Even professional writers rework their ideas and language as they revise. No one gets it right the first time. Use the guide to help you revise your essay.

Ed
Help with Revision
Find a **Peer Review Guide** and **Student Models** online.

REVISION GUIDE		
ASK YOURSELF	**PROVE IT**	**REVISE IT**
Introduction Does my introduction contain a clear claim?	**Underline** the main claim your argument makes.	**Add** or **revise** your claim to clarify or strengthen your position.
Organization Are paragraphs organized logically? Have I used transitions to connect ideas?	**Number** the paragraphs so that the most important reason comes first. **Circle** transitions that connect ideas.	**Rearrange** paragraphs in order of importance. **Add** transitions to connect ideas.
Support Does the argument include reasons and evidence to support the claim?	**Put a star** (★) next to each reason. **Highlight** the supporting evidence for each reason.	**Add** reasons and/or evidence such as a fact, example, or comparison to support each reason.
Citing Sources Have I cited sources properly?	**Put a check mark** (✓) next to references to your sources.	**Add** precise references to your sources.
Opposing Claims Do I address opposing claims with counterclaims?	**Underline** opposing claims. **Highlight** the counterclaim that addresses it.	**Add** possible opposing claims and counterclaims.
Style Have I used a formal style?	**Cross out** (✗) any informal words and phrases.	**Replace** informal text with formal words and phrases.
Conclusion Does my conclusion logically flow from the reasoning of my argument?	**Highlight** parts of your conclusion that support your claim and reasons.	**Revise** the conclusion so that it follows from the reasoning of your argument.

APPLY TO YOUR DRAFT

Consider the following as you look for opportunities to improve your writing.

- Make sure your claim is clear and strongly stated.
- Check that your reasons and evidence are related to your claim.
- Correct any errors in grammar and punctuation.

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Peer Review in Action

Once you have finished revising your argument, you will exchange papers with a partner in a **peer review.** During a peer review, you will give suggestions to improve your partner's draft.

Read the introduction from a student's draft and examine the comments made by her peer reviewer to see how it's done.

First Draft

It's Time to Put the Brakes on Space Travel
By Angela Hernandez, Riverside Middle School

I believe it's a bad idea to send humans into space. *The Challenger* and *Columbia* space shuttle disasters serve as important reminders of this. There are not enough good reasons to continue flying manned space missions to outweigh the risks. Space travel isn't worth it.

Try to capture the audience's attention by beginning with a question or eye-opening statistic.

You could make your claim more specific by directly stating why space travel isn't worth the effort.

Now read the revised introduction. Notice how the writer has improved her draft by revising based on her peer reviewer's comments.

Revision

It's Time to Put the Brakes on Space Travel
By Angela Hernandez, Riverside Middle School

Did you know that the *Challenger* and *Columbia* space shuttle disasters resulted in the combined loss of 14 astronauts' lives and around $27 billion? These tragic events are only two in a long list of space-travel accidents. They remind us why it's a bad idea to send humans into space. There are not enough good reasons to continue flying manned space missions to make up for the risks and expenses of doing so. People should stop the dangerous and costly exploration of space.

Nicely done! This is a much more engaging way to introduce your argument.

Good job clarifying your claim.

APPLY TO YOUR DRAFT

During your peer review, give each other specific suggestions for how to make your arguments more effective. Use your revision guide to help you.

When receiving feedback from your partner, listen attentively and ask questions to make sure you fully understand the revision suggestions.

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4 EDIT YOUR ARGUMENT

Apply the finishing touches to your draft. Edit your draft to check for proper use of standard English conventions and to correct any misspellings or grammatical errors.

Watch Your Language!

USE TRANSITIONS

As you know, **transitions** connect ideas and show how they are related. Skillful use of transitions helps create coherence in writing, and it can strengthen an argument.

Read the following sentence from "Humans Need to Explore Outer Space."

> Scientists are also looking toward Mars as a potential new home for humankind.

The word *also* signals that the author is building on the idea of colonizing outer space.

Transitions to Try

Here are some common transitional words and phrases:

Comparison/contrast: but, however, although, similarly, likewise

Elaboration: also, in addition, too, furthermore

Cause/effect: as a result, therefore, so

APPLY TO YOUR DRAFT

Now apply what you've learned about transitional words and phrases to your own work.

1. Read your paper aloud and underline transitions you've used.
2. Add transitional words to connect ideas.
3. Watch out for overuse of transitions. Remove any that are unnecessary.

5 PUBLISH YOUR ARGUMENT

Share It!

The prompt asks you to provide your argument in the format of an essay for your school newspaper. You may also use your argument as inspiration for other projects.

Ways to Share

- **Engage in a debate** with a classmate who is on the opposite side of your argument.
- Imagine NASA has announced that robots are replacing humans on their next space mission. **Write a letter** expressing your views.
- **Record a podcast** on the topic. See the next task for tips on how.

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Speaking & Listening

Create a Podcast

A spacewalk is that exciting part of an astronaut's journey when he or she leaves the vehicle to explore outer space. With a group of classmates, you will plan and present a ten-minute **podcast,** or audio recording, explaining how a spacewalk is accomplished.

Plan Your Podcast

As a group, decide which aspect of spacewalks each person will research. Group members should become experts on their assigned topic, which may include:

- purposes of spacewalks
- training that prepares astronauts for a spacewalk
- spacesuits and other equipment astronauts use on a spacewalk
- steps for a safe, and successful, spacewalk

Use the chart to take notes. Then, refer to the chart to draft a script of your part of the podcast.

Do Your Research

To research spacewalks, you can consult NASA's website and other reliable sources of information.

ASK YOURSELF	ANSWERS AND NOTES
What is the best way to grab the audience's attention?	
How should I structure my podcast? With a host and interviewer? With one voice giving information about each aspect?	
What music or sound effects should I add to help communicate a mood?	

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Practice with Your Group

Because a podcast has no visuals, you will have to rely on the audio alone to communicate ideas. That's why it's important to practice speaking from your script before you record.

Use this guide to practice each person's speaking part and give specific suggestions for improvement.

Active Listening

When you listen to other members of your team, remember these tips:

- Give each presenter your full attention.
- Suggest ways for presenters to improve their delivery.
- Ask questions to clarify any confusing parts.

SPEAKING GOAL	NOTES FOR IMPROVEMENT
Make your delivery smooth. Practice words that you stumble over and rearrange sentences to clarify ideas.	
If you are using an interview format, listen closely and pause before responding to questions.	
Speak loudly and clearly. Stress important words for dramatic effect or emphasis.	

Record Your Podcast

You don't need fancy equipment to produce a podcast. With a smartphone or computer and software for sound editing, you're all set. Work with your teacher to plan what equipment you will use and when you will record your work.

Use these tips to keep your podcast on track.

- Find a quiet place to record.
- Display each page of your script in front of you, so you don't have to flip or rustle paper during the recording.
- Use sound effects sparingly. Too many noises can be distracting.
- Use free editing software to edit your recording.

Share It!

- **Hold a podcast listening party** with your class.
- **Create a list** of memorable spacewalk facts that you've learned from the podcasts.
- **Have a group discussion** about the sound effects used in each podcast. Share your favorites.

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Interactive Speaking & Listening Lesson: Using Media in a Presentation

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Reflect & Extend

Here are some other ways to show your understanding of the ideas in Unit 3.

Reflect on the **Essential Question**

Is space exploration a daring adventure or a dangerous risk?

Has your answer to the question changed after reading the texts in the unit? Discuss your ideas.

You can use these sentence starters to help you reflect on your learning.

- **I think differently now because . . .**
- **I want to learn more about . . .**
- **I still don't understand . . .**

Project-Based Learning

Create an Infographic

You've read about space exploration and the possibilities—and dangers—that await space travelers. Imagine that NASA has selected your school as a candidate to provide a youthful perspective about the future of space exploration. Now, with a group of classmates, create an infographic about one aspect of space exploration covered in the unit.

Here are some questions to ask yourself as you get started.

- What interests me most about the wonders and challenges of space?
- What message or information do I want my infographic to communicate?
- How can I use images and layout to help convey that information?

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Media Projects

To find help with this task online, access **Create an Infographic.**

Writing

Write a Short Story

. . . but with a twist: Your story must take place on a space shuttle and feature two characters. Use the chart to jot or sketch your ideas. Then, write your story.

ASK YOURSELF	MY NOTES
Are my **characters** on a space mission? Are they human?	
Are my characters in **conflict** with each other? Or are they united against a bigger problem?	
What is the **resolution** to the conflict? What do the characters learn?	

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